Allied-Axis

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German Special Issue One

Panther Attack in Alsace-Lorraine
The A4/V2 Missile
The kleines Kettenkraftrad
The sIG 33/1 Grille SPG

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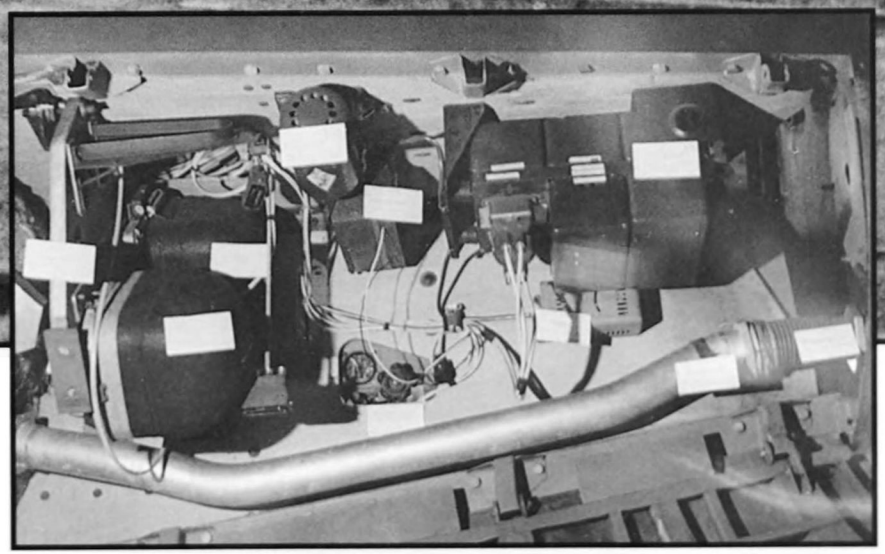
The A4/V2 Missile

At the end of World War II, the victorious Allies searched across Germany for technical information on German weapons, especially the advanced jet aircraft and rockets of the late war period. Virtually all completed V2 missiles had been expended or destroyed. The U.S. Army occupied the Mittlewerke underground V2 assembly plant in Nordhausen, removing enough materiel to build some 200 V2 missiles in the United States. The British managed to find enough parts to build eight complete V2s, but lacked key components and support equipment to use the V2s as intended. After searching Europe for several months, the British managed to gather the equipment needed to fire several V2 missiles.

The British V2 test program was called "Operation Backfire," and was conducted in October 1945 at Altenwalde, near Cuxhaven in the British occupation zone, on the site of a naval gunnery test range. Some of the 8000 German POWs taken from missile units and the Peenemuende test facility were detailed to re-enact the preparation and firing of V2 missiles for the British Army. As the Germans wore their wartime uniforms, the photos and movies taken during "Operation Backfire" appear to be wartime German footage. Due to the secret nature of the V2 program, most of those who worked on the project knew only a small part of the whole thing. "Operation Backfire" was a learning experience for all concerned.

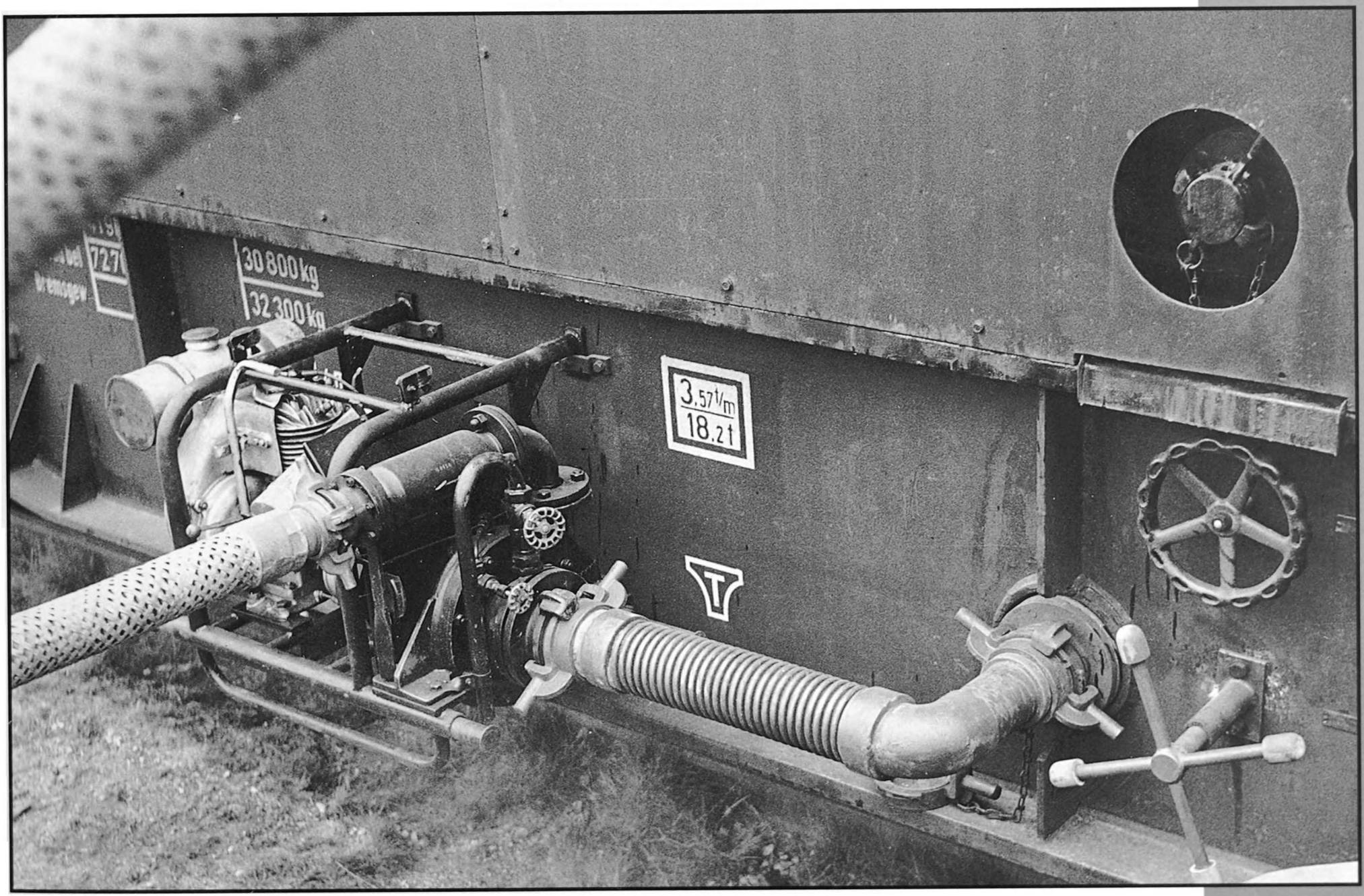
At Cuxhaven, gunners of the Royal Artillery examined a V2 missile during a lecture on the V2 system as part of "Operation Backfire." The V2 was a large weapon, measuring 46 feet (14 meters) in length and 11 feet 8 inches (3.5 meters) across the fins. The movable fin sections were simple vane type rudders, which steered the missile in flight once it was traveling fast enough for air flow to work against the rudder sections. For initial control at launch, there were guide vanes which sat in the exhaust stream of the rocket motor and provided pitch and roll control at low speeds during liftoff. Note that this V2 has been fitted with dollies for transport, using the narrow gauge tracks formerly used to handle ammunition for the naval weapons test center. The British chose a black and white test scheme, instead of operational camouflage. There were several color schemes applied to operational V2s. Most missiles actually used were painted in a "Gezackt" ("ragged") pattern using Signal White, Earth Gray, and Olive Green. Late war missiles were painted overall Olive Green. (IWM)

The motor assembly for the V2 produced some 55,000 lbs (25,000 kg) of thrust and typically burned for about 65 seconds. The motor burned a mixture of liquid oxygen (A-Stoff) and a 3:1 ratio mix of methyl alcohol and water (B-Stoff). The fuel was contained in large tanks in the center of the missile body, and was fed into 18 burners in the rocket motor by high speed turbine pumps. The turbine pumps used a mixture of 85% hydrogen peroxide and 15% water (T-Stoff). The T-Stoff was fed through a catalyst (calcium permanganate) and decomposed into high pressure steam and oxygen to drive the pumps. In this view of a V2 motor, note the turbine pumps to the left (behind the nitrogen pressure bottles), the multiple burners on the combustion chamber and the simple welded frame that mounted the motor assembly to the missile body. (IWM)

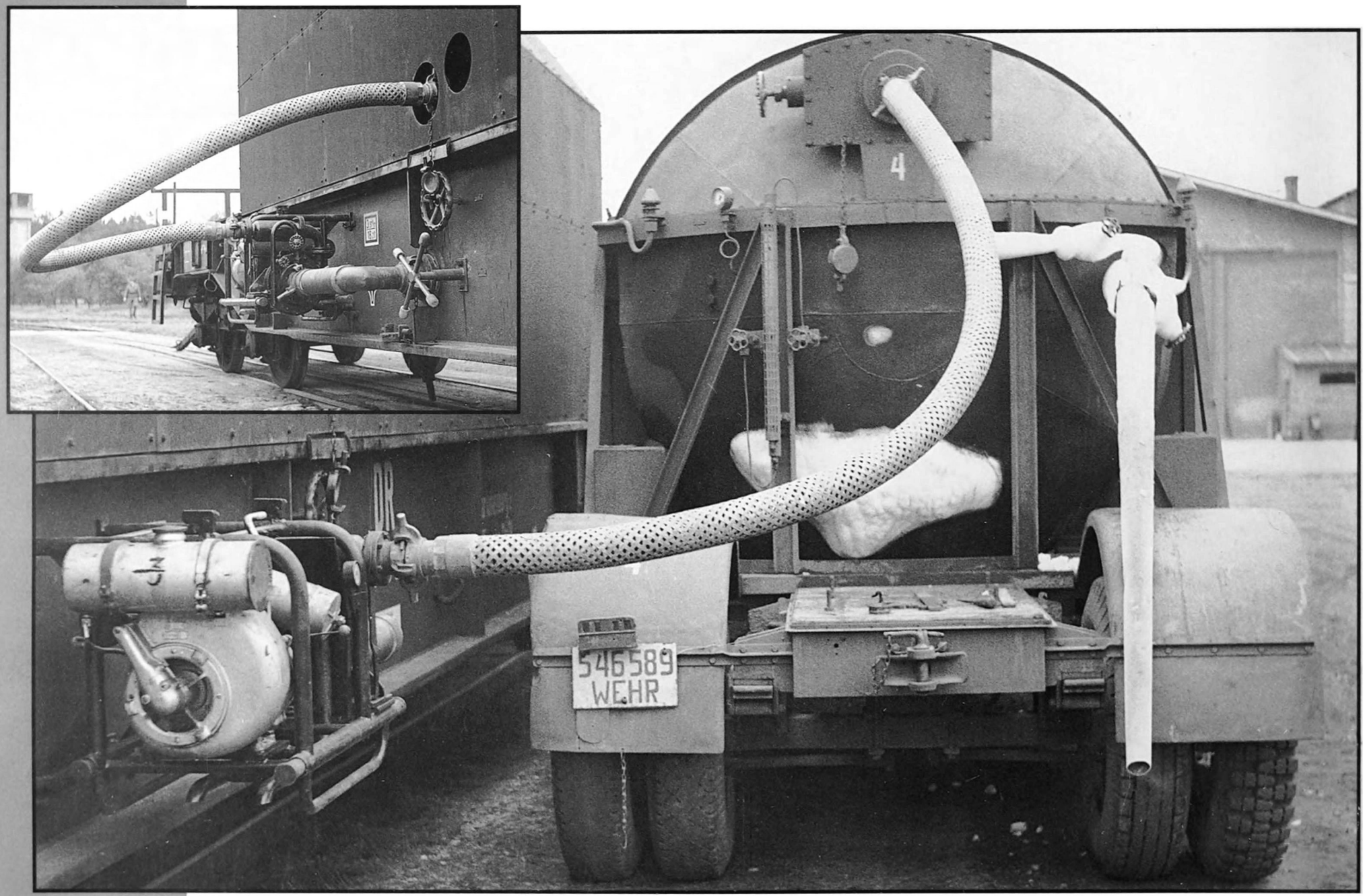


Right: The V2 missile was guided by a combination of three-axis gyroscopes and an electronic system that sent directional control signals to the guide vanes in the tail section and also received guidance signals from the control vehicle prior to launch. The guidance package (seen here) was the weakest point of the V2; most of the 3,300 V2s launched did not land close to their intended targets. This led eventually to the V2's being used as a "terror weapon" aimed at large population centers or military port facilities, such as Antwerp in Belgium. Almost 10,000 V2 missiles were completed or had reached an advanced stage of assembly by the end of the war. Launch sites against Britain were located on the Dutch coast. (IWM)

Primary transportation of V2 missiles and their fuel and support equipment was by rail. Though not a common practice, it was theoretically possible for a battery to raise and fire a V2 missile from a stationary train. German railroads were favorite targets of Allied aircraft, and so most V2s were fired from mobile launchers traveling by road. Nonetheless, most supplies of fuel were carried by train, as were replacement missiles. The missiles were delivered to a forward transfer point called a "Field Store," each of which could handle 30 missiles and supplies at a time. The V2 batteries arrived at the Field Store to receive missiles and supplies. Each battery had three V2 missiles, each crewed by a platoon of 39 men. The rail car in this photograph was an insulated tank car carrying liquid oxygen (A-Stoff). Each of these cars could refill several A-Stoff trailers used by the launch crews. **Inset:** At one end of the A-Stoff rail tank car was a locker to store the pipes and hoses. Above the hoses in this view is a refilling point for the tank car with a pressure gauge and fluid level to guide the refilling crew. Also stowed in this compartment were feed hoses to connect to other A-Stoff vehicles. All the A-Stoff used in the V2s at launch was carried in towed, wheeled trailers. (IWM)

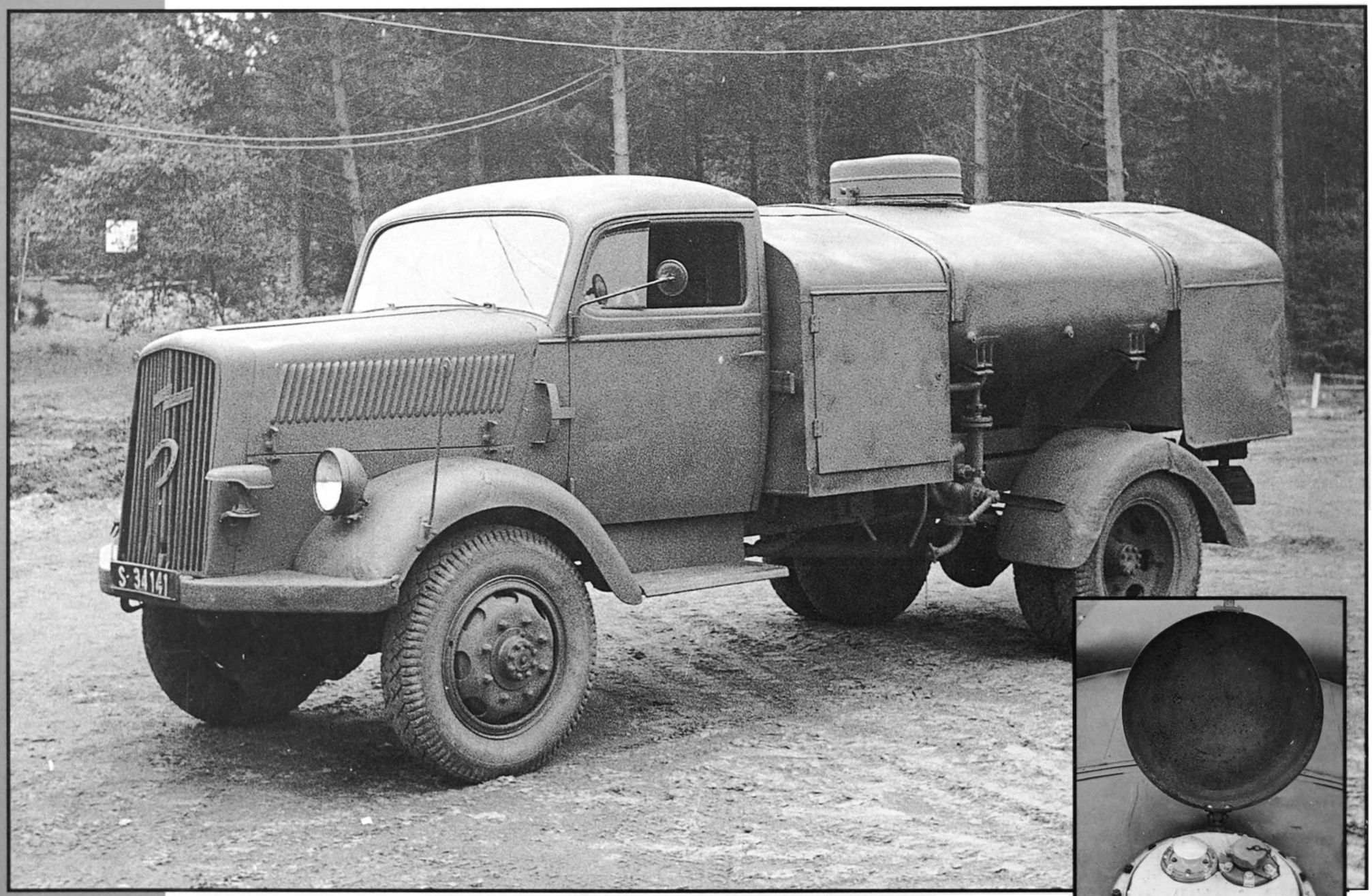


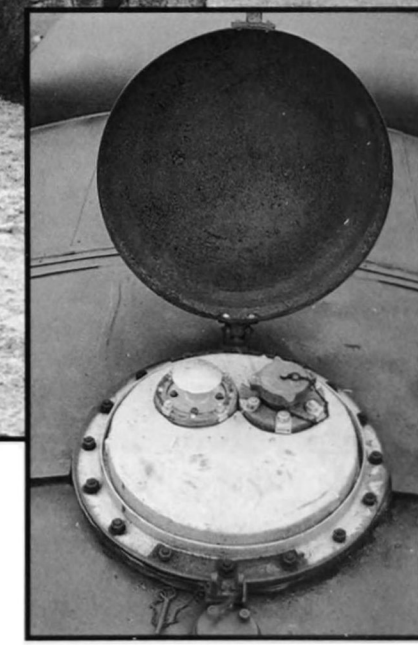
An engine-driven pump was attached to brackets on the side of the A-Stoff rail tank car and hoses were then connected to the pump and wheeled A-Stoff trailer. The pump was a simple rotary type, and was driven by a one-cylinder air-cooled gasoline engine. The straight portion of the feed pipe and all of the feed hoses to the wheeled trailer were insulated with external covers to keep the A-Stoff as cold as possible. When not in use, the hoses were disconnected and stowed on the wheeled A-Stoff trailer, and were used later to fuel the V2 missile. The pump was used when the rail tank car was only partly full; when the car was full, gravity was sufficient to fill the first few A-Stoff trailers. The pump was also stowed on the wheeled trailer to pump A-Stoff into the V2 during the launch. (IWM)



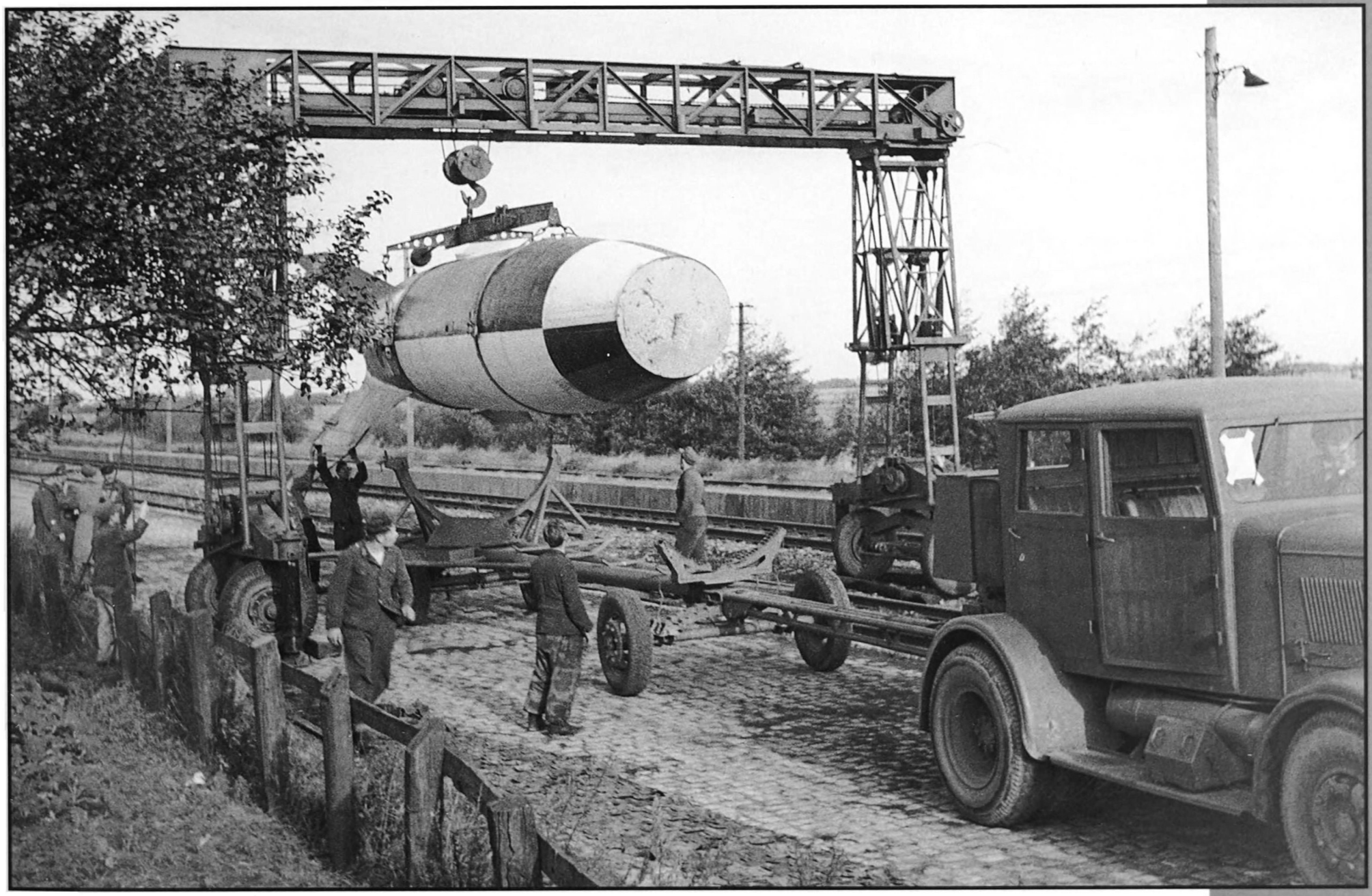
During the filling process, the extremely cold temperatures of the A-Stoff caused ice and frost to condense around the metal fittings. The A-Stoff wheeled trailer was heavily reinforced to contain the pressure in the tank. Here the engine-driven pump is used to transfer the A-Stoff to the trailer. The British Army had to spend months trying to locate all the equipment needed to fire the V2 the same way the Germans had during the war. All the trailers, trucks and support equipment had to be rounded up and gathered at Cuxhaven to conduct "Operation Backfire." **Inset:** The pump could also be used to fill the A-Stoff rail tank car or to re-circulate the liquid oxygen, as seen here. Note the double gauge track beneath the tank car. The test facility at Cuxhaven had an extensive network of narrow gauge rail tracks to handle ammunition during firing tests. (IWM)

When the A-Stoff rail tank car was completely full, gravity was used to fill the wheeled trailers without using the portable pump. The A-Stoff wheeled trailer was a simple design but heavily reinforced to hold the weight of the insulated tank and the fuel inside. These trailers normally were towed by special tractors, most commonly the Hanomag SS100, a 4x2 heavy road tractor built for the purpose, as seen here. Though it was possible to tow more than one trailer, generally each trailer had its own towing vehicle. The overhead gantry crane in the background was a permanent type, not the folding crane used by the V2 batteries. (IWM)

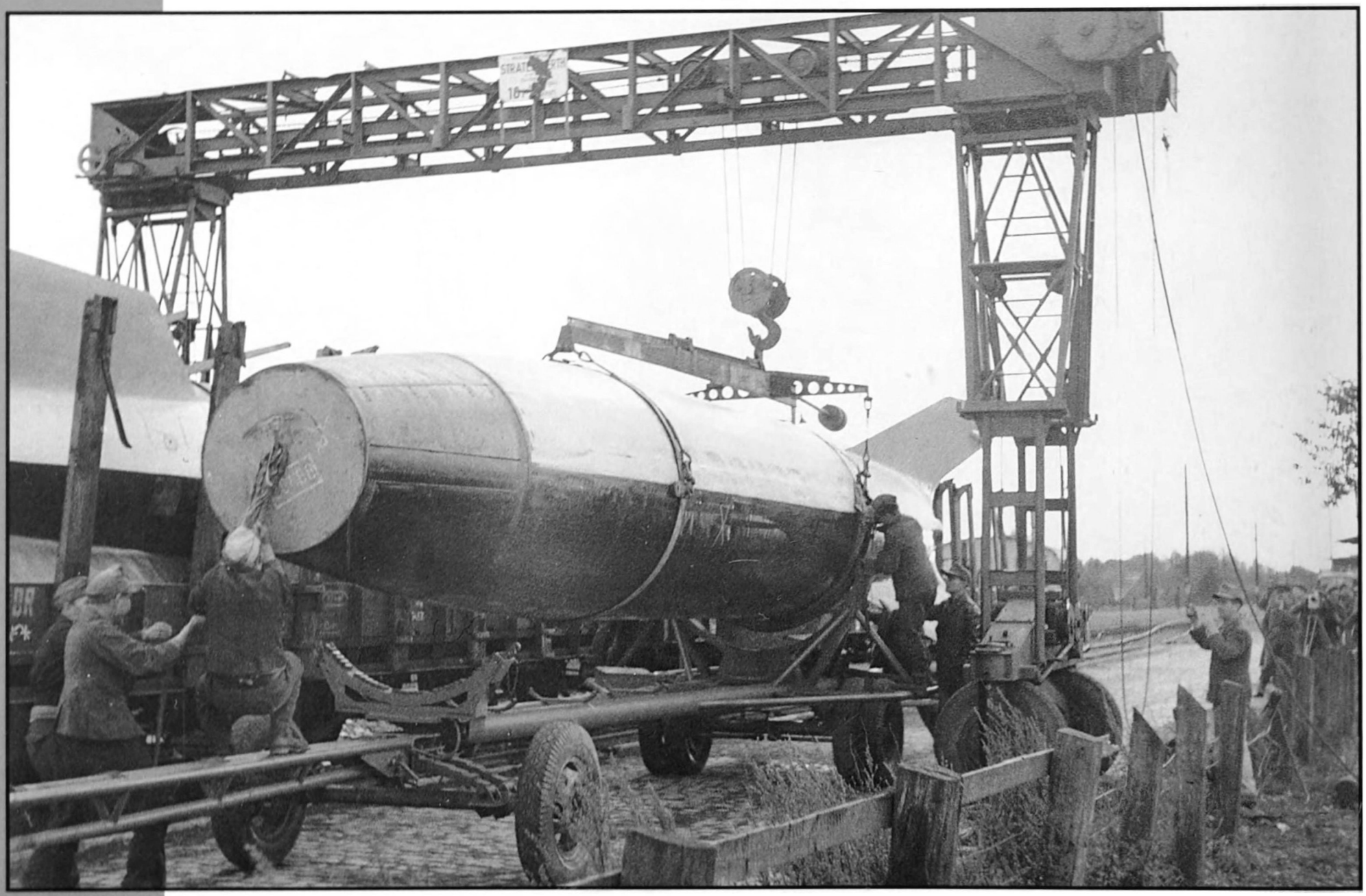




The turbine pumps for the fuel system of the V2 missile were run on T-Stoff (85% hydrogen peroxide and 15% water). T-Stoff was an extremely dangerous fuel; the 15% water was added to prevent explosions by controlling the rate of decomposition. This A-Typ (4x4) Opel "Blitz" tank truck was built to carry the T-Stoff for the rocket motor's turbine fuel pumps. T-Stoff was highly volatile and could react with almost any organic substance. When combined with a catalyst (calcium permanganate in the V2 system), T-Stoff broke down into superheated steam and oxygen at a temperature of 500 degrees C (932 degrees F). **Inset:** Because T-Stoff was so volatile, pressure could build up in the tank. The T-Stoff tank truck had a safety pressure valve. This protected the tank by reducing internal pressure, which in turn reduced the rate at which the T-Stoff decomposed. The safety pressure valve is on the left in this view and the filling valve is on the right. Both were protected by a domed cover. (IWM)



After the V2 missiles were delivered by train to the Field Store, they were transferred from the rail cars to transport trailers using a 15-ton collapsible overhead gantry crane. The crane was set up at the rail-head to off-load the missiles and other equipment. The crane would then be collapsed into its travel configuration and towed to the forward launch preparation site. There it would be erected again and used to transfer the V2s to their launch trailers. Note that at this point, the V2 missiles did not have war-heads installed or fuel in the tanks. The missile airframe and motor weighed 4,485 lbs (2040 kg). The towing vehicle here was the Hanomag SS100. (IWM)



The V2 missile was transported from the railhead to the battery forward preparation site on a transport trailer called the "Vidalwagen." This was a simple A-frame tubular structure with formed supports to cradle an unloaded, unarmed V2 missile. The weight of the trailer and missile was enough that only heavy duty road tractors like the Hanomag were used to tow them. The Vidalwagen was very simple and inexpensive to build and each battery had three Vidalwagen trailers for every launch trailer. The V2 battery would fire their first trio of missiles and then return to the forward preparation site to reload missiles onto the launch trailers. When all the missiles had been expended, the battery could then return to the Field Store and reload all the trailers and refill the support vehicles. (IWM)

The Hanomag SS100 tow vehicle was the type most commonly used in V2 batteries. This view shows how the V2 was secured on the Vidalwagen trailer, as well as the guard rails and supports to protect the lower fins. The use of mobile equipment like this enabled German rocket troops to fire thousands of these missiles without being detected by Allied aircraft. Only a lucky sighting of an erected V2 at launch would have given an Allied pilot the chance to attack the firing battery. The use of road equipment also kept the V2 units from being totally dependent on the railroad system, which in the spring of 1945 was under constant attack. About one third of the 10,000 V2s built were fired at Allied military and civilian targets.

Once the V2 missile had been brought to the battery forward preparation site, the warhead and fuse were installed. A small fixed overhead crane was used to lift the 1-ton warhead into place and the assembly crew fastened it to the front of the missile body. The cylindrical fitting around the warhead protected it during transport and carried the lifting loads during assembly. The V2s were shipped without the warheads as a safety precaution and to keep the missile as light as possible during shipment. The handling and firing of liquid-fueled missiles was far more complex than the scientists at Peenemuende thought field troops could accomplish. In fact, field units launched some 3,300 V2s within a six month period (September 1944 to March 1945). (IWM)

To handle the transfer of the V2 missile from one conveyance to another, the Germans adopted the 15-ton capacity collapsible overhead gantry crane already in use in Panzer Divisions to lift heavy tank turrets and other large loads. It was an ingenious design suitable for road or rail transport, and could be taken virtually anywhere a Panzer Division or V2 missile battery would have to go. It proved perfect for the V2 units' needs. The lift system allowed the crews to transfer missiles from the Vidalwagen trailers to the "Meillerwagen" launching trailers. Here the Hanomag SS100 tractor had dropped the trailer at the missile forward preparation site. **Inset:** The 15-ton gantry crane had a motor drive for the winches, both to raise and lower loads and to move them laterally. The tow bar assembly carried a compressed air bottle for the brakes. Folded down in its road configuration, the crane could be transported by road or rail within most normal clearance limits for bridges, tunnels or curves. Just inside the vertical tube struts were the cables and winches for raising and lowering the crane. (IWM)

Left: Erecting the gantry crane took a number of men, as the process of unfolding the support structures had to be done manually. With the road wheels blocked against a tree trunk, the crew began the task of erecting the crane. Time was of the essence in the last months of the war, due to Allied planes, but in fact, the great difficulty in spotting a V2 being prepared for launch made this a fairly safe procedure. The complex scissors arrangement of tubes and struts had to extend and retract reliably and quickly, but also had to support the weight of the gantry overhead frame and of the load being carried. (IWM)

Right: The first step in erecting the gantry crane was to move the folded end tower sections out to the ends of the gantry cross frame. This was done using pulleys and cables. Once the end structures were in position, the crew could raise the crane to its working height. Here, the end tower structures have been moved to the end of the cross frame. With the folded end frames repositioned, the crew began to turn them sideways. The uniforms here were a mix of various service types and work fatigues. The end frames pivoted in the center, but it took most of the crew to rotate them. (IWM)

The crew swung the collapsed tower end frames 90 degrees to be perpendicular to the gantry cross piece. From this position the gantry was raised to its full height. When the crane had been erected, several missiles would be loaded onto their "Meillerwagen" launching trailers. The cables and pulleys on the folded tower end frame were used to draw the scissors frame upright, raising the gantry to its working height. (IWM)

With the folded end frame turned sideways to the cross piece, the crew could then raise the crane structure. The scissors design was light weight and very strong. The cable and pulley system was the simplest way to move the scissors to raise (or lower) the entire crane. After adjusting the cables and pulley system, the crew carefully began lifting the crane, making sure the two ends were raised evenly together. The large jack struts were adjustable and were locked in place before the crew raised the gantry. Stabilizing the crane was very important, as the heavy loads could cause an unstable crane to fail. (IWM)

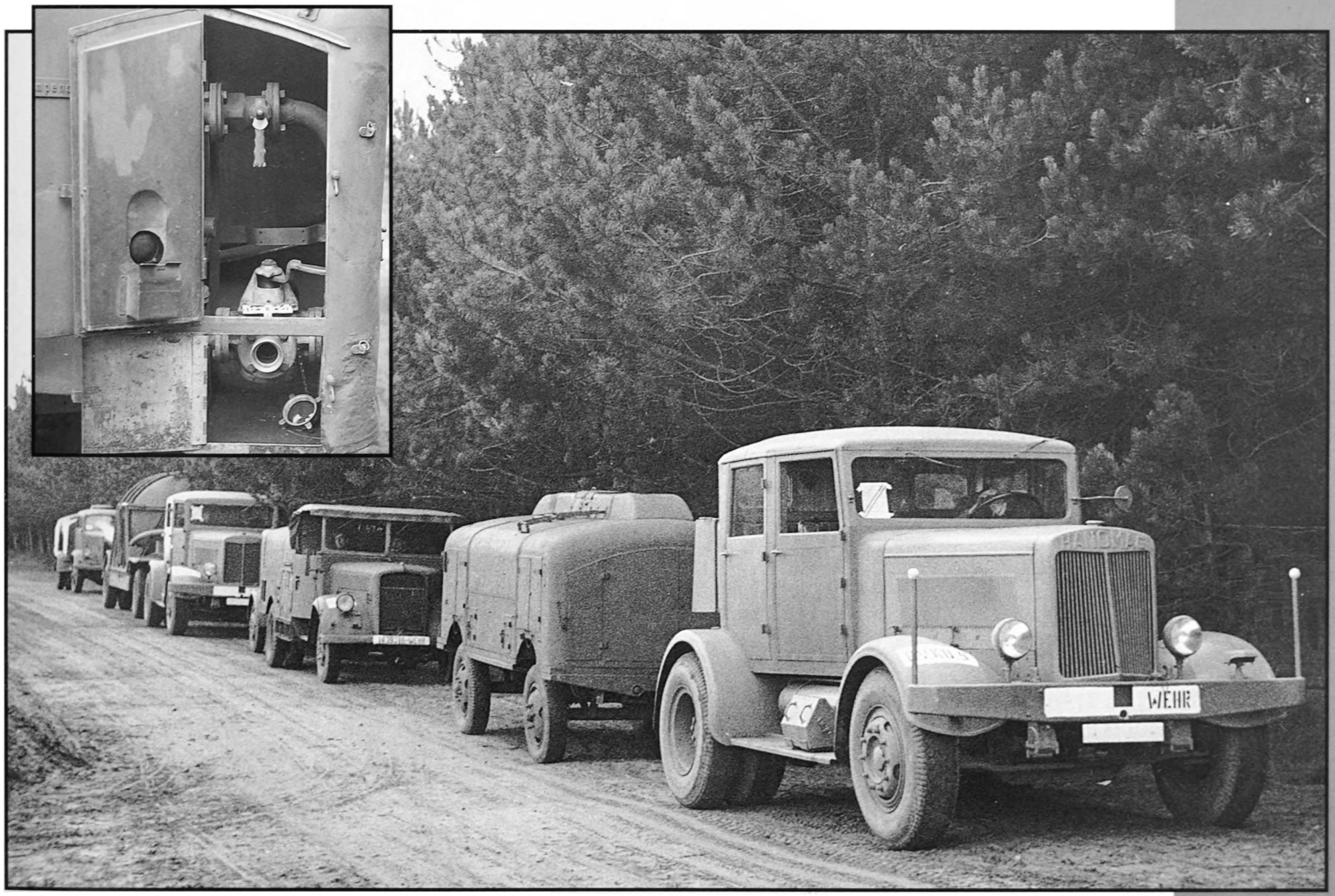
The 15-ton gantry crane was a large structure, long enough to straddle two railroad tracks to transfer loads from one train to another or to a truck or wagon parked next to the track. The motorized bogie truck and lifting hook ran transversely along the gantry, allowing loads to be moved side to side. Here, the crew had raised the gantry about half way, tightening the cables on the tower frames to lift the cross piece to its full height. Because of the size of the V2, the gantry crane needed as much ground clearance as possible. (IWM)

With the warhead attached, the V2 missile weighed about 6435 lbs (3015 kg), well within the working limits of this crane. When the warhead had been installed, the missile was ready to be transferred to the Meillerwagen launch trailer. The straps that had secured the missile to the Vidalwagen were fastened to a lift beam. This, in turn, was hooked to the gantry lift mechanism. When the crane was fully extended, as seen here, there was sufficient clearance to lift the V2 clear of the supports on the Vidalwagen and move it to the Meillerwagen. The size of the men here in relation to the rocket shows how large the V2 was. It was the largest tactical missile fired in combat, though some modern ICBMs are larger. (IWM)

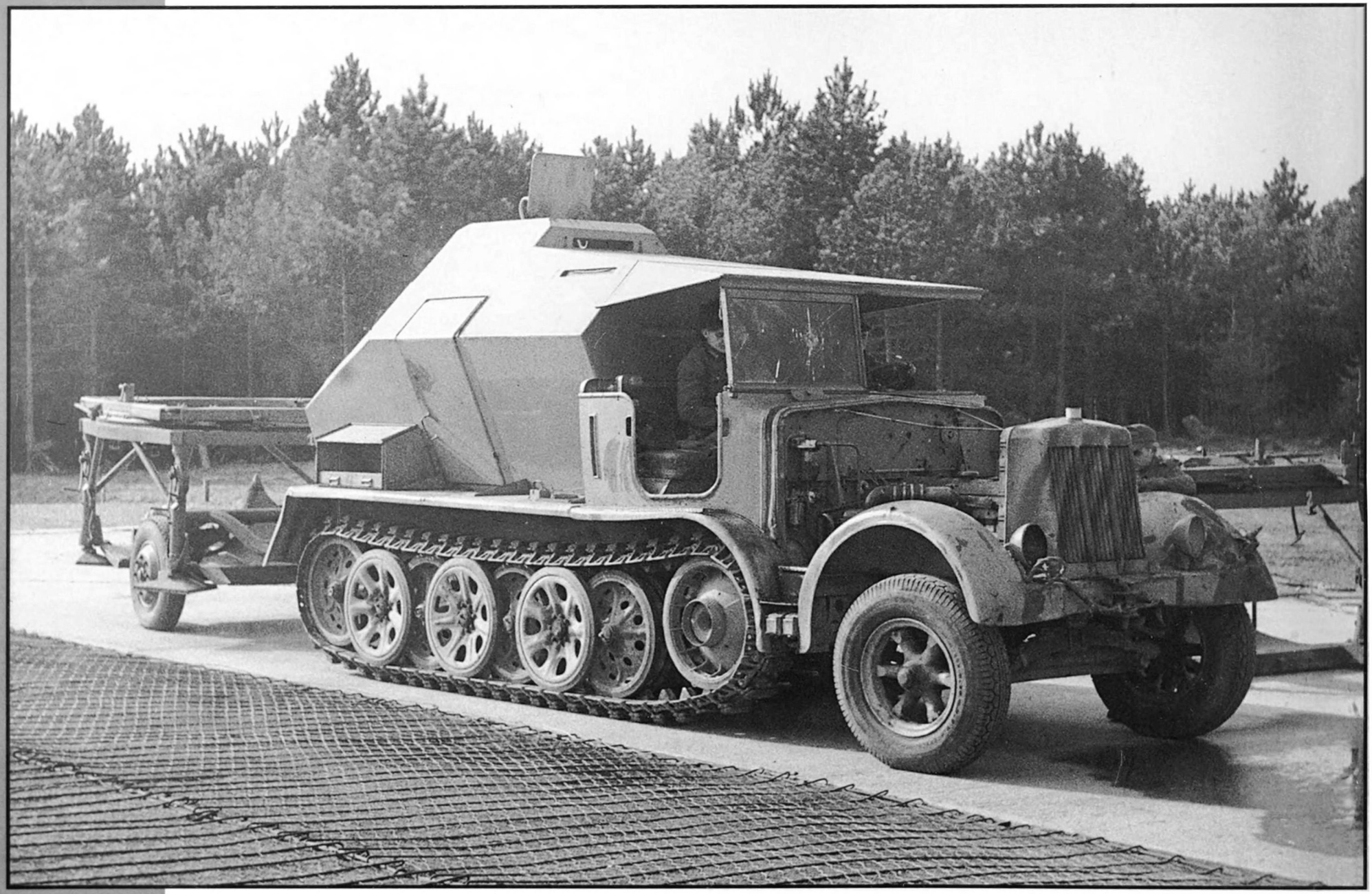
The missile was lifted from the Vidalwagen trailer (left) and moved to the other side of the gantry to be loaded onto the Meillerwagen. As seen here, the Vidalwagen had a simple tubular frame intended only for transporting the missile. The Meillerwagen was heavier and much more complex, designed to transport the missile to the launch site and then launch it. The Meillerwagen also supported the V2 during fueling, which could be done only at the launch site. (IWM)

Crewmen guided the V2 missile as the crane moved it over to the Meillerwagen. The Meillerwagen trailer, also towed by a Hanomag SS100 tractor, consisted of two major assemblies: the transport trailer frame and the missile launch elevating frame. The elevating frame was hydraulically powered and raised the V2 to the vertical fueling and launch position. Since there were three Vidalwagens for each Meillerwagen, the launch trailer was usually reloaded two times after firing the first V2 before the battery broke down the firing site and returned to the transfer point to get more missiles. Note the cradle sections extended more than halfway around the missile body to secure the missile in place and prevent it from falling off the trailer during fueling. They were opened for loading, as seen in this view. (IWM)

Cradles and straps held the V2 onto the Meillerwagen launch trailer after loading. When all the missiles allotted to a fire mission had been launched, the gantry crane would be folded back to its road configuration and towed to a new launching site. The V2 launch sites were pulled back into Germany during the last months of the war and V2 firings lasted into March 1945. From this forward preparation site, the V2 on its Meillerwagen was towed to the launching site. A V2 battery was able to erect, fuel and launch three missiles within two hours. The relatively short launch time was a major factor in the inability of Allied aircraft to stop V2 launches, although many V2s were destroyed in bombing raids. Even in the last month of V2 operations, firings were not discovered until it was too late. Ground troops, as they advanced into Germany. destroyed a great many V2s. (IWM)



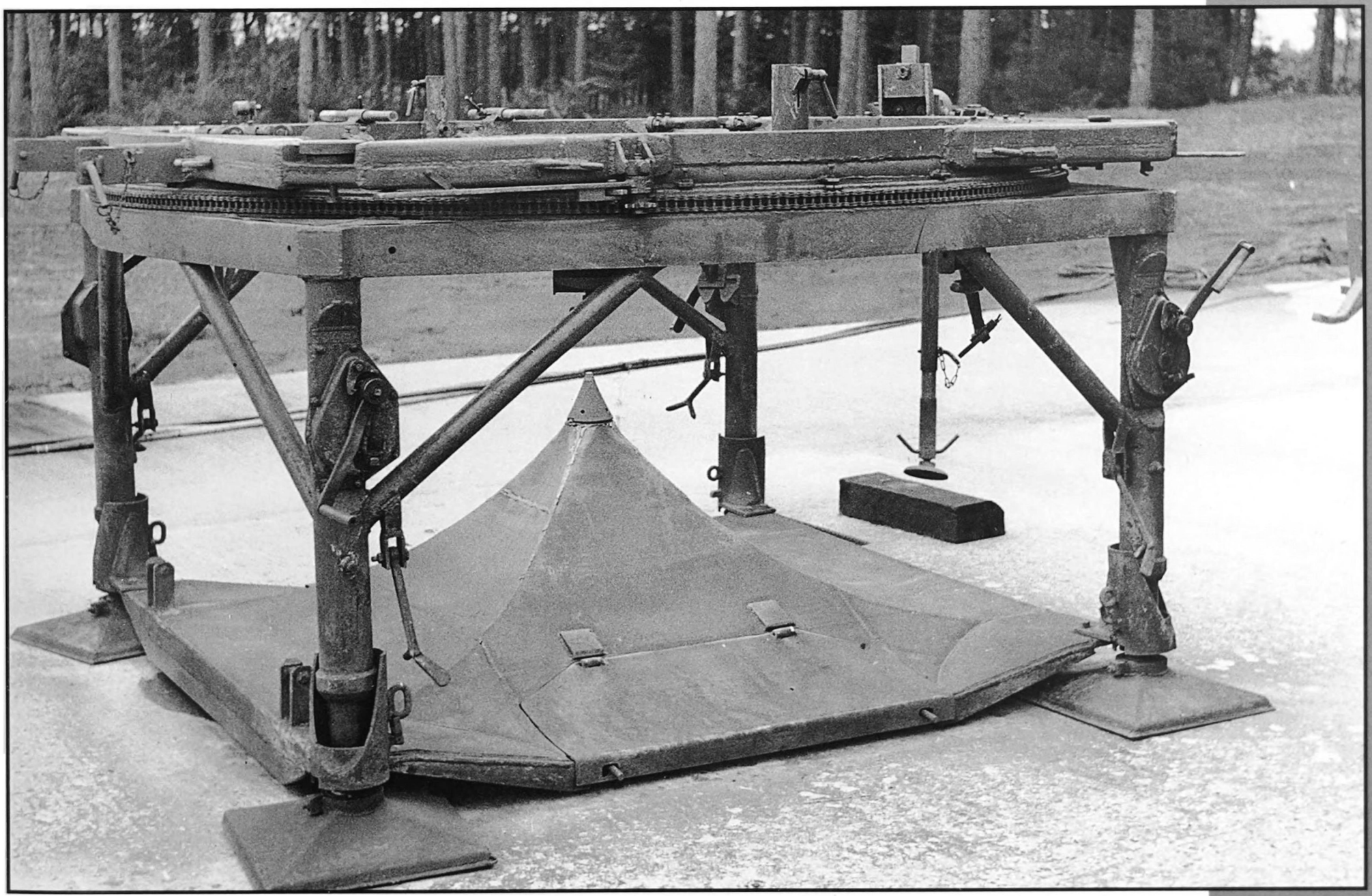
The fueling column for each V2 missile consisted of several vehicles. In this typical column, the first vehicle was an SS100 towing a trailer loaded with B-Stoff (alcohol/water mix). Second was a 3-ton tank truck also loaded with B-Stoff, towing a service trailer. Next was another SS100 tractor towing the A-Stoff (liquid oxygen) trailer, followed by an Opel "Blitz" tanker carrying T-Stoff (hydrogen peroxide and water) for the V2 motor's turbine fuel pumps. All V2s were towed to the launch sites empty and fueled after being raised to the vertical position. **Inset:** The B-Stoff trailer had a pump and fittings to transfer the alcohol/water mixture to the missile's upper fuel tank. The A-Stoff (liquid oxygen) filled the lower tank. The large handle seen at the bottom controlled the shutoff valve. Similar fittings were present on the B-Stoff tank trucks as well. The perceived difficulties of handling these volatile and dangerous fuels in the field convinced many scientists and SS officials (the SS controlled the V2 production program) that large underground reinforced launch complexes should be built to fire the V2s. Two such complexes were started in France, but after they had been bombed and destroyed, it was obvious that no fixed installation would ever be safe. Thus, the mobile launch system was developed and used successfully. (IWM)



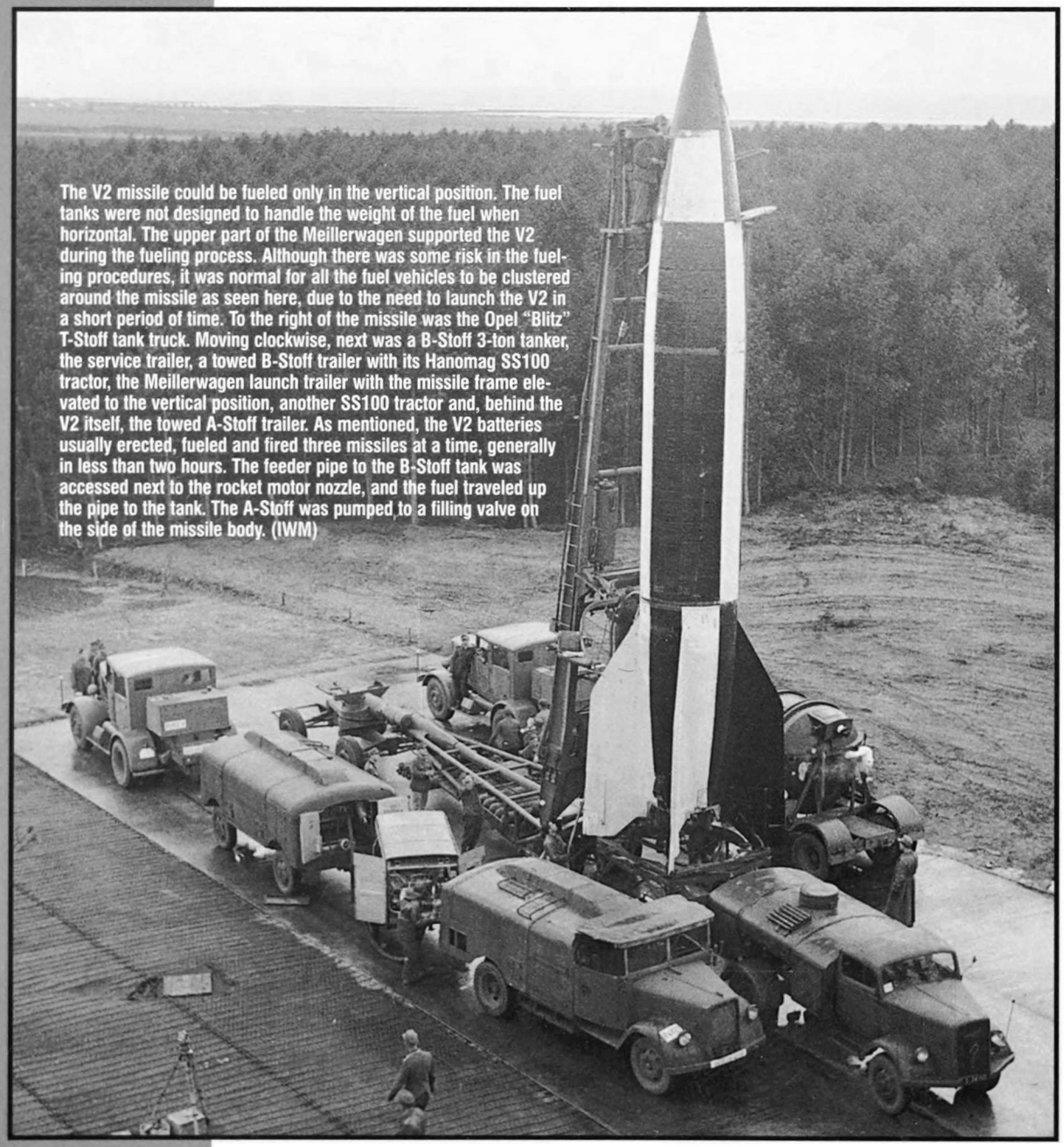
Launching the V2 missile required a control vehicle to carry the firing crew and launch control equipment. The Germans chose the 8-ton Krauss-Maffei SdKfz 7 artillery tractor as the basis for the V2 control vehicle. A light armored superstructure was added to the rear bed of the tractor, containing basically a mobile missile launch blockhouse. There were armored glass viewing ports, ignition/firing controls and equipment to send final guidance data to the V2 immediately prior to launch. The armored superstructure protected the firing crew from the blast of the rocket motor exhaust. This vehicle was called the "Feuerleitpanzerfahrzug fuer V-2 Rakaten auf Zugkraftwagen 8t (SdKfz 7)." These vehicles were allotted to each battery, normally one for each Meillerwagen launch trailer (IWM)

Seen from the front, this is the same vehicle from the previous photo. Note the lack of the engine section hood. The British had to scour Germany to find all these items of equipment, and some of them were much the worse for wear. The sheet metal in the front of the vehicle was not damaged by the rocket exhaust since the armored rear end was placed closest to the missile during firing. This control vehicle often towed the "Bodenplatte" firing table, as seen here. The Bodenplatte was used to support the missile during fueling and launching. (IWM)

The "Bodenplatte" launch firing table was designed to be towed to the launch site using a detachable trailer dolly. At the launch site, the Bodenplatte was lowered to the ground, the trailer dolly towed away and the wheel doors in the bottom cone were closed. After firing was over, the trailer dolly would be attached, the Bodenplatte table raised, and the assembly could then be towed to a new launch position. It was a well thought out and efficient design and proved very successful. (IWM)

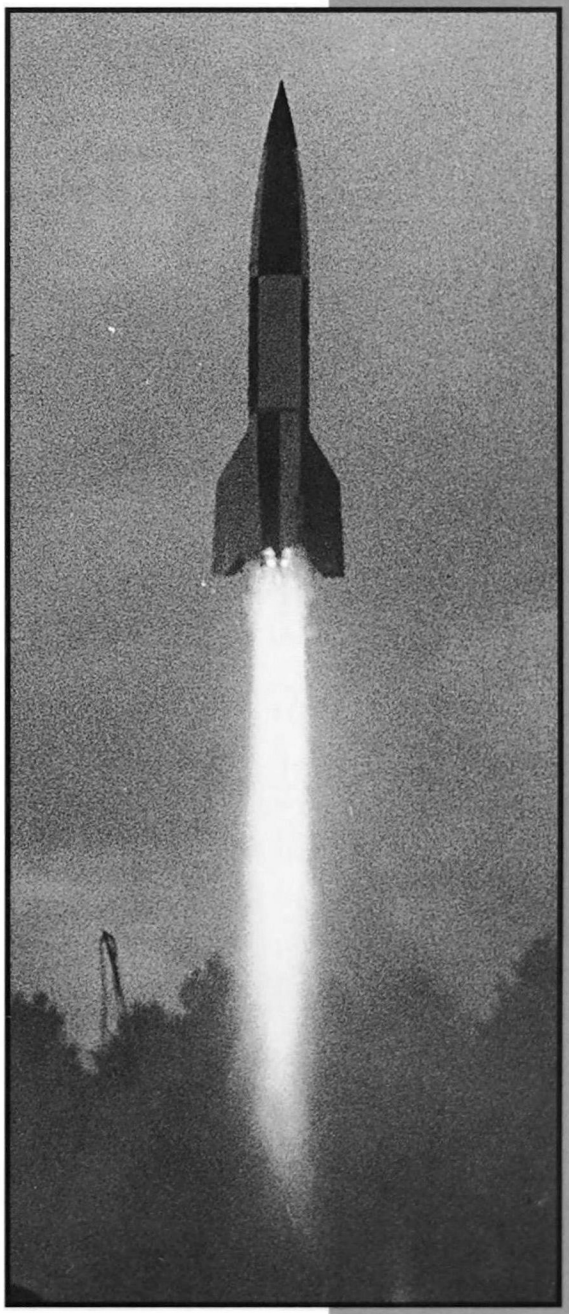


This close-up view of the Bodenplatte firing table shows the basic design. The center deflector cone was steel with a hardened tip. It was designed to disperse the blast from the rocket exhaust at launch. The steel framework and jacks allowed the Bodenplatte to support the 12.8 ton (13,000 kg) firing weight of an armed and fueled V2 missile. The jacks on the corner struts raised and lowered the deflector cone and also adjusted the table to ensure it was level. Since the V2 rested only on the Bodenplatte during firing (the Meillerwagen was lowered and moved before firing the rocket motor), the table had to be as level as possible. Fine adjustments could be made to the upper part of the table as well, to align the table supports that bore the weight of the loaded missile. (IWM)



The V2 missile could be fueled only in the vertical position. The fuel tanks were not designed to handle the weight of the fuel when horizontal. The upper part of the Meillerwagen supported the V2 during the fueling process. Although there was some risk in the fueling procedures, it was normal for all the fuel vehicles to be clustered around the missile as seen here, due to the need to launch the V2 in a short period of time. To the right of the missile was the Opel "Blitz" T-Stoff tank truck. Moving clockwise, next was a B-Stoff 3-ton tanker, the service trailer, a towed B-Stoff trailer with its Hanomag SS100 tractor, the Meillerwagen launch trailer with the missile frame elevated to the vertical position, another SS100 tractor and, behind the V2 itself, the towed A-Stoff trailer. As mentioned, the V2 batteries usually erected, fueled and fired three missiles at a time, generally in less than two hours. The feeder pipe to the B-Stoff tank was accessed next to the rocket motor nozzle, and the fuel traveled up the pipe to the tank. The A-Stoff was pumped to a filling valve on the side of the missile body. (IWM)

Right: Hydraulic cylinders elevated the upper part of the Meillerwagen and the V2 missile to the vertical position, until the missile was centered over the Bodenplatte firing table. Raising the missile before fueling had the additional advantage of allowing the Meillerwagen to be lighter and more reliable than it would have been lifting the full weight of the fueled missile, and was considerably less risky, as well. The A-Stoff flowed through the insulated hose, seen passing up the Meillerwagen frame. The engine-driven pump was required to lift the liquid oxygen up to the V2 lower tank. Outriggers on the Meillerwagen stabilized the trailer as the V2 was raised to the launch position. The lower part of the Meillerwagen was a welded tubular structure; the upper frame was largely channel and beam construction. Both were easy to build and strong for their weight. (IWM) **Opposite left:** Before igniting the rocket motor to launch the V2, all support equipment was withdrawn to a safe distance. The Meillerwagen was returned to the forward preparation site to load another missile and fuel vehicles would be sent back to be refilled. At the launch site, the firing crew entered the armored control vehicle. The control vehicle was positioned a distance away from the V2 on the firing table in case of a malfunction or accident. The launch crew could view the missile firing through the glass block vision ports and, after a successful lift-off, they



could observe through the top hatch as well. The armored superstructure was a complex design, but easily installed on the frame of the SdKfz 7 half-track. (IWM) **Right:** A successful launch, one of several conducted by the British Army during "Operation Backfire." In spite of the successful recreation of the wartime use of this sophisticated weapon, the British didn't gain as much information from their research as the United States did later on, using the German scientists who had conceived and operated the V2. Immediately after the war, Britain considered the chief architects of the V1 and V2 programs to be war criminals because of the extensive damage to civilian areas caused by these weapons. The United States prevailed, however, and the majority of the German scientists who had worked at Peenemuende, including General Walter Dornberger and Wernher von Braun, went to the U.S. to work first for the Army missile program and then for NASA. The technology from the V2 program led directly to the development of the Saturn V, which carried several teams of astronauts to the moon. (IWM)

Panther Attack in Alsace-Lorraine, 1944

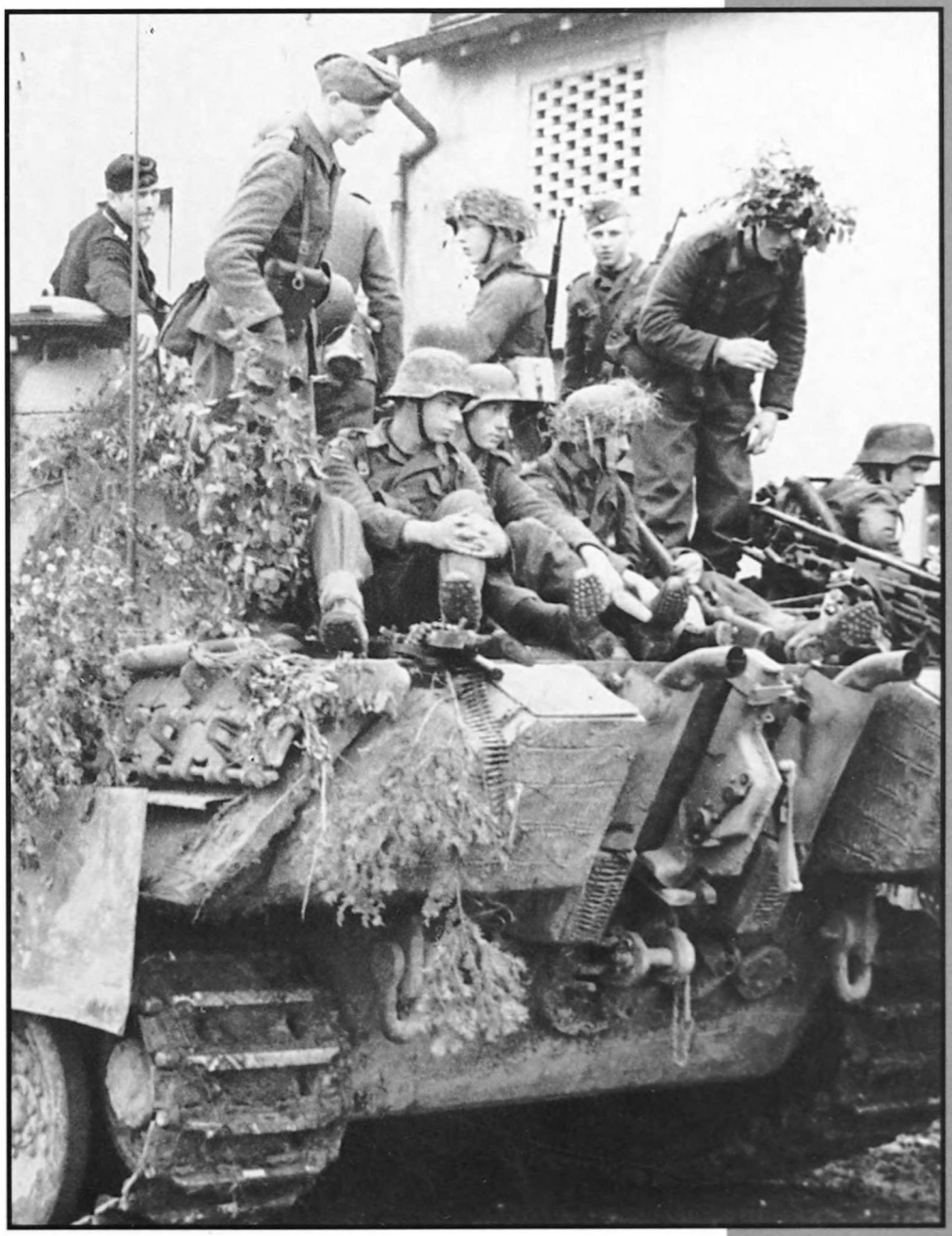
After the successful breakout from Avranches and the Normandy area, the Allied armies moved across France so quickly that by late August 1944 they had secured the area between the Seine and Loire rivers, ten days ahead of the original schedule. By September, they were across the Loire, threatening the western border of Germany. The 4th Armored Division of Lt. Gen. George Patton's Third Army got across the Meuse river near Commercy and the 7th Armored Division established a bridgehead across the Meuse at Verdun. Only the Allies' decision to concentrate the main thrust against Germany in the north, using Montgomery's 21st Army Group, and the cutting of supplies to Patton's forces, brought the Third Army drive to a halt the first week of September 1944.

In response, Adolf Hitler directed an offensive operation intended largely to drive back the American forces and give the Germans time to restore and reinforce the Westwall defenses protecting Germany itself. An armored force would be assembled to strike at the eastern flank of the American units. 5. Panzerarmee headquarters was moved south from Belgium to command the attack. The new commander of 5. Panzerarmee was General Hasso von Manteuffel, the famous commander of "Grossdeutschland." Heeresgruppe G in 5. PzArmee was to mount the attack on the flank of Patton's forces on the Meuse. Initially, two Panzer Divisions, three Panzergrenadier Divisions and a total of six new Panzerbrigades were to be part of the attacking force. A number of units were under strength and others had to be given up for other operations.

The units selected for the offensive included 3. and 15. Panzergrenadier Divs, 17. SS Panzergrenadier Div., 11. and 21. Panzer Divisions, and Panzerbrigades 106, 107, 108, 111, 112, and 113, three of which were being brought in from Germany. 3. Panzergrenadier Div., 17. SS Panzergrenadier Div., and Panzerbrigade 106 were not available when the attack was to start. 21. Panzer Division could put up only a Kampgruppe, and 11. Panzer Division was supporting 19. Armee, and could not be re-supplied or refitted. The remaining half of the attacking force was under strength, having lost tanks and transport, and was only a fraction of what FM Gerd von Rundstedt had requested to defend the Westwall. **Above:** Here, a column of Panther tanks from Panzerbrigade 111 moves toward the town of Bures, 20 September 1944. Travel by day was risky, due to Allied air superiority, and thorough foliage camouflage was very common. There was a shortage of transport vehicles and many Panzergrenadiers rode on the tanks. (BA)

With the opening of Allied supplies, Patton's troops had reached the Moselle river on 7 September, XX Corps of the Third Army crossing the river south of Metz. It now became critical for the Germans to move to stop Patton before he could reach the Rhine, which was his goal. Panzerbrigades 111 and 112 arrived at Epinal, though with some difficulty, and Panzerbrigade 113 was at Belfort. Due to the heavy vehicle losses, Panzerbrigade 111 was partly equipped with Holzgas (wood-gas) trucks for the Grenadier regiment. Nonetheless, things began to move. **Above:** Here, a Panther of Panzerbrigade 111 enters Bures on 20 September 1944. This vehicle, as it approached the town, was also in the previous photo. The heavy foliage cover was a standard precaution in the French campaign. Along many of the major roads, hundreds of pull out air attack positions had been prepared. Tanks, trucks and other vehicles would pull off the roads during an air attack, or when Allied fighters had been sighted, and pre-positioned foliage would hastily be packed around the suspensions and wheels. If available, foliage was also piled around the superstructures. As seen here, foliage was often attached to soldiers' helmets for better concealment. (BA)

Panzerbrigade 112 had suffered the loss of most of its Panthers on 13 September in a battle with part of the French 2ème Division Blindée (2nd Armored Division). A similar fate had befallen Panzerbrigade 106 a week earlier, and that unit had few tanks remaining. Panzerbrigades 107 and 108 were sent to reinforce 1. Fallschirm Armee and 7. Armee, further weakening the German forces. All of the units on hand were in poor condition, with missing equipment and second-class transport in some cases. The brigade staffs had no command tanks, nor were there any recovery vehicles to retrieve damaged equipment. On 16 September, Panzerbrigade 111, with elements of 11. Panzer Division, attacked the French units east of the Moselle. Though driven back, the Germans were relieved when the French withdrew across the Moselle. The tactical situation forced a change in the German plans, and a smaller offensive in the Lunéville sector was proposed, with the intention of cutting off American units moving east from the Moselle. **Above:** This photo shows a Panther of Panzerbrigade 111 entering Bures on 20 September. The tank is painted in the standard mid-war three-color scheme, with the usual foliage cover. Many of the transport trucks had broken down or had been destroyed. Carrying the Panzergrenadiers on the tanks solved a number of problems, including having an infantry escort for the armor. (BA)



Panzerbrigade 111 didn't take part in the battles on the 19th of September. The brigade was deliberately misdirected by a farmer and didn't rejoin the LVIII Panzerkorps until late afternoon. Patton's XV Corps had broken 5. Panzerarmee's defense line and Panzerbrigade 113 had lost over 30 tanks, nearly half of them Panthers. As a result of its own losses, Panzerbrigade 111 was ordered to change direction again, toward Blanche-Eglise. However, von Manteuffel sent a Kampfgruppe into Bures as a ploy to make it appear he was following the original plan. The tanks carrying the unit's Panzergrenadiers arrived in the town on 20 September. **Left:** This is a close-up of the Panzergrenadiers on the engine deck of the Panther shown in the last two pictures. The nearest individual wears a sleeveless jerkin made from Italian shelter quarter material, a popular alternative to the standard German camouflage clothing. He also still wears high jackboots, though the standard in 1944 was the low shoe and cloth gaiters. Older pieces of uniforms and equipment were prized, since the quality of German uniforms and equipment declined during the war. (BA) **Right:** The Panzergrenadiers on this Panther show the variety of uniforms and equipment commonly seen in the later war period. Note the paint or mud daubed on the soldiers helmets. This was a common practice, although the cloth camouflage helmet cover was also widely used. (BA)

The 4th Armored Division task force under Col. Creighton Abrams started its drive in the afternoon of the 20th, and moved south. A Kampfgruppe of Panzerbrigade 111, detailed to protect the flank of the brigade as it prepared to move to Blanche Eglise, met the Americans near Ommeray and stopped the first unit, knocking out several Shermans. Positioned on a hill, the Panthers had a good view of the area and made the most of it. When the rest of the American force had arrived, they engaged the PzKpfw IVs of the brigade, knocking out 8 German tanks but losing 12 of their own. The American forces turned toward Moncourt in the late afternoon and took that town in a night action. **Above:** This shot was taken as the troops prepared to move out as supporting infantry. The machine gunner in the foreground has thrown the ammunition belt over the top of the gun as he carries it, to reduce the strain on the feed mechanism from the relatively heavy belt. Some of the troops here have their gear stowed in non-standard ways. Initially, wearing of equipment was very much regulated. As the war progressed and combat experience dictated what worked and what didn't, many soldiers wore their uniforms and equipment to suit their needs. Occasionally, as with the strapping of gas cape pouches to the gas mask canisters, these practices violated standing regulations. (BA)

The main body of the American 4th Armored Division had advanced during the day of the 20th as well, and had reached beyond Dieuze and Château-Salins, which created a large gap between 1. Armee and 5. Panzerarmee. Heeresgruppe G was ordered to close this gap, and the commander, Generaloberst Johannes Blaskowitz, ordered both 1. Armee and 5. Panzerarmee to attack together to repair the lines. Progress was slow, and the gap could not be closed. Blaskowitz wanted von Manteuffel to press 11. Panzer Division into action to relieve the Panzerbrigades, most of which were exhausted and down to only a few serviceable tanks. The lack of progress led Hitler to replace Genlobst. Blaskowitz with General der Panzertruppen Hermann Balck on 21 September. **Above:** This Panther ausf G has come to a halt, and the crew has quickly covered the tank with foliage. The foliage was very successful in breaking up the tank's distinctive shape and making it hard to see from the air. This tank, from Panzerbrigade 111, has the three-color camouflage seen at this point, and white turret numbers. The camouflage here is fairly elaborate in that the gun barrel has been carefully painted. This view shows the one-piece side armor, which distinguished the ausf G and improved the side protection of the Panther. Tool stowage for the ausf G was based on that of the earlier ausf A. (BA)

On 21 September 1944, Gen. Patton's forces advanced into the Lunéville sector, intent on driving past the German flank defenses south of Lunéville. The 313th Infantry Regiment of the U.S. 79th Infantry Division took Moncel, just east of Lunéville. Its advance was stopped at the main German line of resistance in a wooded area east of the Meurthe river, as was the 314th Infantry's 3rd battalion near Saint-Clément. The Germans, meanwhile, had a commanders' meeting at 5. Panzerarmee HQ at Vasperviller. An assault was planned for the following day, although Gen. von Manteuffel said he would have to wait for 11. Panzer Division to arrive before starting a major offensive. It was decided to send Panzerbrigade 111 from Bures to move through Blanche-Eglise and seize high ground west of Juvelize. The move would start early the next day. **Above:** During the initial assault in the Lunéville area, Panzerbrigade 111 had captured a number of American vehicles from the 42nd Cavalry Squadron, including this M8 armored car. The original U.S. olive drab color scheme was quickly altered with strokes of what may be German dark yellow paint, or possibly mud. It is also possible that this color scheme was an American original. The large crosses are the mark of the new owners. Virtually all the stowage on this armored car is American, and the Germans have had to do little to put the M8 into service. (BA)

The morning of 22 September was foggy, initially giving the Germans an opportunity to advance safe from the dangers of Allied air cover. The reality was that the attack started late due to late arrivals, and many German units became lost or disoriented in the thick fog. Panzerbrigade 111 had traveled from Bures to Blanche-Eglise earlier, but the men were exhausted by the recent engagements. The advance toward Juvelize began in mid-morning, and the lead elements of the German force engaged the 25th Cavalry Squadron defending the town. Seven U.S. light tanks were destroyed, although a company of tank destroyers of the 704th TD Battalion also knocked out three German tanks. The Germans pushed on, and Panzerbrigade 111 had taken Juvelize by midday, though now under attack by 9th A.F. fighter-bombers. **Above:** Seen in the town of Parroy, southeast of Bures, this is another of the M8 armored cars captured in Lunéville on the 18th. This example has an olive drab color scheme with a heavy layer of dust lightening the entire car. The 37mm main gun was a bigger weapon than most German armored cars carried. It was capable of destroying many light armored vehicles at ranges of up to several hundred yards. Often these captured designs were used just as they had been acquired, but some were modified to carry German armament. (BA)

The German attack on the Juvelize sector had ended in almost total failure, with heavy losses in equipment and troops. On 23 September, Panzerbrigade 111 had only 7 tanks and 80 men in combat ready condition, though the situation improved later in the day as the recovery crews were able to repair a number of tanks and other vehicles. Nonetheless, the loss of so much equipment and men had seriously affected the unit's fighting abilities. The local situation was so confused that, in spite of its greatly depleted strength, the brigade was ordered to hold a line from Blanche-Eglise to Guéblange. A Kampfgruppe from Panzerbrigade 113 was detailed to hold the road from Ley to Bourdonnay, but it too was recovering from its heavy losses three days earlier. **Above left and right:** The bulk of the German soldier's personal gear was hung from the suspender harness in order to distribute the weight better. The major disadvantage of the German infantry gear was that the belts and suspender harness had to be adjusted to prevent as much noise as possible. Equipment could bang together and give away a soldier's position. The belt could be worn without the suspender harness. There were metal hooks in the M1941 blouse that hooked under the belt to support the weight, which was much more comfortable for the soldier. One of these hooks can be seen on the man with his back to the camera in the right-hand photo. (BA)

As XXXXVII Panzerkorps was forming its defensive line from the Parroy forest to the 19. Armee flank, the U.S. 4th Armored Division was also taking a rest to refit and prepare for further action. 9th A.F. P-47 Thunderbolts were directed to German targets by 4th Armored observers, and casualties included the commander of Panzerbrigade 113, Oberst von Seckendorff, who was killed. The German commanders tried to reorganize their units to make some offensive action possible. The 559th Volks-Grenadier Division moved south from Metz and reinforced 1. Armee's left flank, along with what was left of Panzerbrigade 106. **Above left:** These Panzergrenadiers are part of a heavy machine gun team. The standing grenadier to the right has a folded heavy tripod mount for the MG34. Note the wire frame added to the helmet in front. This man also has managed to keep his early-issue jackboots. (BA) **Above right:** These infantrymen are wearing the M1943 blouse, and the man in the foreground has a nearly standard layout of his personal equipment. On his left hip is an older non-folding model shovel. This shovel carrier is canvas with leather straps. The early war carrier was all leather. Next to the shovel is the bayonet and scabbard. This was usually worn on top of the shovel, held in place by the strap that secured the shovel in the open frame. This is a good view of a painted 1942 helmet with the wire frame for foliage. (BA)

Germany designed and fielded a number of excellent light artillery pieces. Among the best of these during the early war years was the fine 5cm PaK 38 antitank gun. It was a popular weapon, but became obsolescent at the end of 1941, with the introduction of the T34 and KV series of tanks on the Eastern Front. However, the gun carriage was an excellent design and the Germans went to considerable lengths to find other weapons that could be mounted on it's lower carriage. One avenue was to modify heavier guns so they could be fired safely from the lighter platform. One such design was the 7.5cm PaK 50. This was a cut-down 7.5cm PaK 40 with the L/46 barrel being shortened to only L/30. While antitank performance would suffer, the PaK 40 had such a good kill margin that it was felt this less powerful variant could still knock out or disable the most common Allied tanks. Very few PaK 50 guns were issued to troops in the field and photos are quite rare. Among the few that did see service was this example seen in the Alsace campaign, September 1944. The carriage is almost exactly the same as the 5cm PaK 38. The gun itself retains the PaK 40 style breech and rear barrel with recuperator. The forward barrel was cut down and a large 3-baffle or 5-baffle muzzle brake was fitted to control recoil on this lighter mounting. (BA)

The 7.5cm PaK 50 was a very low gun and it was handled much like the PaK 38 on which it was based. The lower velocity reduced armor penetration, but the gun was still useful against medium armor at moderate ranges, and it could also fire against other targets using HE. The PaK 50 used the same ammunition as the PaK 40. In general, the German light antitank guns were the most technically advanced weapons of this type during the war. Here, the entire lower carriage and upper gun shield of the 5cm PaK 38 is almost unchanged, except for very small details. The shortened 7.5cm PaK40 barrel and its recuperator have been fitted to the PaK 38 carriage and lower mount. Though the tree branches obscure it, this gun is fitted with a 3-baffle muzzle brake to reduce recoil. A crew of 5-6 men was usually all that was needed to handle the gun and fire missions. Antitank guns were most often used from heavily camouflaged positions in ambush. Because of their low silhouettes, guns like the PaK 50 were very dangerous to enemy tanks and other vehicles. The only major disadvantage to low antitank guns like the PaK 50 was the effects of the considerable muzzle blast. The gun here is hidden in a heavy cover. Foliage on a fairly powerful gun doesn't last long; the muzzle blast is usually enough to dislodge most light camouflage type foliage. (BA)

During the fighting around and in Lunéville, the advance elements of Panzerbrigade 111 captured a number of American vehicles, including this M3A1 infantry half-track. The M3 series was rugged, reliable, easy to maintain and generally capable of long periods of use without breaking down. All of these advantages endeared it also to the Germans. This example, captured during the early fighting around Lunéville, again has been well garnished with the usual foliage cover. The overall olive drab paint scheme hasn't been changed, except for the addition of a German word, part of which is hidden. This half-track has the front-mounted winch, which made it even more useful to the Germans. It could retrieve most unarmored vehicles with little trouble. Though the M3 was much simpler than the Sdkfz 251 SPW used by the Germans, in fact its performance was fairly comparable. The SdKfz 251's major design failing was the lack of a driven front axle. The M3's driven front wheels allowed it to negotiate terrain that even the '251 could not handle well. Cross-country performance was similar, in spite of the SdKfz 251's sophisticated torsion bar suspension and steering differentials. The M3 also had considerably more interior room, always hard to find. Both sides seem to have had some fascination with the equipment used by the other army and both used captured vehicles and weapons as often as it was practical to do so. (BA)

On 23 September 1944, 11. Panzer Division was moved up to reinforce 5. Panzerarmee, and moved toward Dieuze. This photo gives a good impression of the terrain in the area. Here, a column of Panther tanks advances toward Dieuze from Sarrebourg. Note the tanks are well spaced, which allowed them maneuvering room if attacked and made it difficult for the enemy to destroy all the vehicles in a column. This particular Panther is a new ausf G, and having come from a railhead, hasn't yet been festooned with the usual foliage cover. On an open road like this, the Panthers were capable of good speed and could move quickly. The camouflage scheme is the early 1944 type, dark yellow base with olive green and red brown overspray. The lack of extra stowage, except for the bucket and milk can hanging off the rear, was not uncommon. This trip was made without two dozen Panzergrenadiers packed onto the engine deck, although most of the crew rides outside the tank. There were never enough Panthers to meet the needs of the Panzer Divisions and many Panzergrenadier Divisions had to make do with the smaller PzKpfw IV. A few Panthers could have more effect on the battlefield than many more of the PzKpfw IVs because their very accurate and lethal main guns could break an enemy advance and allow the Germans to regroup and even counterattack. (BA)

11. Panzer Division moved into Dieuze during the latter part of 23 September, after refitting at Belfort. The plan was to join up the division units to form the strongest force possible with the division's weakened state, and then mount a new offensive. Gen. von Manteuffel believed that achieving surprise for the assault could result in a victory for the German forces. The remainder of the 23rd and most of the 24th were spent trying to get as many tanks and vehicles repaired and returned to the line companies for combat. Panthers of 11. Panzer Division pulled into the center of Dieuze on 23 September. The town served as a gathering point for the division's troops during the preparations for the upcoming offensive.

These two Panthers are older ausf As, still in use (as were even older ausf Ds that had survived combat). The muzzle brakes were covered to keep the bores cleaner during road marches and rail transport. Note the gun travel lock and the netting on the glacis plate. Netting like this was one of the most common ways to secure foliage and other camouflage materials to a tank or other vehicle. On the Panther ausf A, the hull hatches for the driver and radio operator were the "lift and rotate" type and were often left open for ventilation. They could be opened or closed using a handle inside, avoiding the necessity of exposing the crew members to enemy fire if they had to be closed quickly. (BA)

German intelligence prior to the planned assault had indicated that the sector around Moyenvic and Marsel, to the north, was lightly held. In a heavy rain, the attack by LVIII Panzerkorps began mid morning of 25 September. The U.S. cavalry units in front of 4th Armored Division were quickly pushed aside and the German move continued against light opposition. The advance elements reached Marsel in less than an hour and entered Moyenvic soon after. Vic-sur-Seille was reached by 10:00, and 5. Panzerarmee had joined up with 1. Armee, achieving the first strategic objective. After the battles of the 25th, 11. Panzer Division returned to the Bures area. There was a great deal of movement over the same ground, as Germans and Americans prevailed in individual actions. This is the first of two views of this particular Panther ausf G as it approached the town of Bures during the day on the 26th. Although it's likely that the photos were taken by the same photographer, the negatives for this shot reside in the Bundesarchiv in Germany, while the following one resides in the ECPArmées in Paris. The foliage, though apparently simply draped over the tank, was actually carefully applied so as not to interfere with any of the critical systems of the vehicle, or any of the entry hatches. The side skirts were removed for maintenance of the suspension and when replaced often didn't match, as shown. (BA)

The second phase of the German offensive was to use the remaining tanks of 11. Panzer Division and the remnants of Panzerbrigade 111 and 113, to reach Bauzemont and Bezange-la-Grande, then turn to join XXXXVII Panzerkorps and trap CCA of the 4th Armored Division in a pocket west of Arracourt. XXXXVII Panzerkorps was ordered to hold its left flank in position and was to bombard the American artillery positions supporting CCA east of Arracourt, but there weren't enough guns to do this. To the right of 5. Panzerarmee, 1. Armee was to resume the attack in the Château-Salins area to try to reach Moncel-sur-Seille, which was west of Bezange-la-Grande. The plan was well thought out, but the weak state of most of the German formations made it essential that all the attacking units perform at the highest level. This second picture of the Panther was taken shortly after the first. After the recent rains in the area, this Panther carries the usual load of mud and dirt on its suspension. The Panther's interleaved roadwheels tended to pick up large amounts of mud and dirt. The foliage on this tank has apparently been arranged to break up its distinctive shape. When foliage was placed over or around tanks hidden this way, they could be very hard to see from the air. In rear areas, the hatches were usually left open for better ventilation. (BA)

The next day, 26 September, both sides regrouped again and reformed their forward lines. Gen. Wood, commander of 4th Armored Division, had moved CCB south, moving to connect with CCA from Réchicourt to the Marne-Rhine canal. Patton decided to put 4th Armored on the defensive for the moment, and so Gen. Wood withdrew part of CCA from its extended positions. As the Americans moved out, German troops of LVIII Panzerkorps moved into Lézey and Coincourt. Gen. von Manteuffel ordered a number of the German armored units to regroup in the Bures area, and 11. Panzer Division began to move toward the town. Here, Panthers of 11. Panzer Division gather in Bures. Here they would be formed into a Kampfgruppe for the forthcoming assault on the 4th Armored positions. The tanks were again used to transport the division's Panzergrenadiers, who had no SPW halftracks for their unit. The shortage of SdKfz 250 and 251 SPWs meant that relatively few Panzergrenadiers were able to fight from these specially designed vehicles. Only a very few divisions had both regiments of Panzergrenadiers mounted in halftracks. Even in Panzer Divisions, only the first regiment had SPWs. The second regiment had to use trucks, and fight as dismounted motorized infantry. As important as the SPWs were in carrying the Panzergrenadiers to action behind armor, their role as fire support vehicles was even more valuable. (BA)

The Kampfgruppe formed as the center of LVIII Panzerkorps attack was put together on the 26th. It consisted of 11. Panzer Division's "Panzer-Aufklärungs-Abteilung 11" (the division's armored reconnaissance battalion), about two dozen tanks and assault guns left from 11. PD, Panzerbrigade 111 and 113 (both in much weakened condition) and 15. Panzergrenadier Division. Moving from Bures, this group would press the Americans back from the high plateau of hills west of Bathelémont, where they had command over the local area. The chief targets on the plateau were Hills 293 and 318 (height listed in meters). Taking these two hills would open this part of the campaign area and allow the Germans to move to their objectives. At 8:00 in the morning on the 27th, LVIII started several diversions against CCA and CCB of 4th Armored Division. At the same time, a strong force tried to break through the 10th Armored Infantry Battalion near Bezange-la-Petite, but they could not break the line, only force a bulge in it. The Americans made excellent use of the terrain and were able to withstand the assault. **Inset:** The light machine gunner was the heart of the standard German infantry unit and tactics. These gunners were well trained, especially those who used the MG34 or the later MG42. Both these weapons had a high rate of fire (900 rounds per minute for the MG34, 1200-1500 rounds per minute for the MG42). **(BA)**

West of Bezange-la-Petite, hard fighting flared around Hill 265, and then Panzergrenadiers managed to capture Xanrey. They were attacked by the Shermans of the 4th Armored Division, who gained the village with artillery support. This ended this part of the German advance, as the Americans still held their positions. The German drive south of the Bezange-la-Petite area initially went better, but the 11. Panzer Division tanks moving west from Bures couldn't cut through the lines held by 4th Armored's CCB. Heavy U.S. artillery fire stopped the tanks west of Bures and the advance stalled. At night, a force from Panzergrenadier Regiment 110 (11. Panzer Division) went north and did take Hill 318, one of the main objectives in the Bathelémont plateau area. Panthers moved through Bures to join the attacking units to drive the Americans out of the Bures and Bathelémont areas. This Panther ausf G, probably of 11. Panzer Division, has the unusual "disk" style ambush camouflage pattern on the front of the turret and gun mantlet. This scheme was painted by spraying the base color of dark yellow over the secondary colors (olive green and red brown at this point in time) through a cutout stencil. This scheme has also been applied to the cupola as well. Combined with the extensive foliage seen here, this camouflage scheme would make this vehicle extremely hard to see under any sort of tree cover. (BA)

On 28 September, the American 51st Armored Infantry Battalion of 4th Armored's CCB retook Hill 318, setting up a series of fierce battles to control this strategic high spot. The Germans again attacked, but this time U.S. artillery broke the assault and the attack failed. In addition, P-47 Thunderbolts from the 9th Air Force flew a number of devastating missions against the troops in Bures and destroyed most of the town. By the time the actions of the afternoon had ended, the lead Kampfgruppe had lost all its tanks. **Left:** This Panzergrenadier is walking along the embankment that marks the southern edge of the lake at Parroy. This was an artificial lake that had been drained due to damage. It was still partly full, and the rest was a huge marsh totally unsuitable for vehicles. A Panther trapped there was recovered after the war, and now is in the museum at Saumur. The M1936 Feldbluse and high jackboots, along with the leather pouches for the MP40 magazines, give this Panzergrenadier the appearance of a soldier from the 1940 French campaign. (BA) **Right:** This Panzergrenadier is much more typical of the period with his later blouse and gaiters. He is toting the long-handled shovel often seen stowed on armored vehicles and is ready to dig in quickly. The 8.8cm Raketenpanzerbüchse 54 he carries was a German development of the smaller American 2.54" (57mm) bazooka captured by German troops in Italy. (BA)

On the morning of 29 September, a Kampfgruppe made up of Panzergrenadier Regiment 110 and Panzer-Aufklärungs-Abteilung 11 went on the offensive and managed to take Hills 293 and 320 on the way to Arracourt. They attempted to take the town as well, but could not advance further. The Americans countered with Shermans and the ever-present air cover. German units caught in the valley between Hill 293 and Hill 318 suffered heavily. The Kampfgruppe that had taken the two hills was trapped when the Americans retook Hill 320. The Panzergrenadiers in the Kampfgruppe managed to straggle back through the thin American lines during the rest of the day and evening. The few tanks from Panzerbrigade 113 had set up a new defensive line near Parroy. As the situation around the Bures area became fluid, the Germans had to move units around to counter American movements. What was left of Bures was still the center of the German forces. The tanks of 11. Panzer Division and Panzerbrigade 113 were all in or around the Bures-Parroy area. Here, the Panther at the left provides cover for Panthers moving back into Bures. These tanks are at the outskirts of Bures. (BA)

The bitter fighting continued through the day and evening of the 29th. Though many of the trapped German troops had managed to return through the American lines and rejoin their units, the many casualties suffered weakened the German position, and reinforcements were not available. This led to Gen. D. PzTrp. Balck meeting with FM von Rundstedt to request major reinforcements. The Field Marshall's hands were tied. Hitler had decided to send what forces there were to support 15. Armee to the north and there was nothing to give to 5. Panzerarmee. As the tanks and other troops of the withdrawing German forces approached Bures, the town filled with vehicles and men. It thus became a prime target for American fighter-bombers, who did attack the town several times, burning much of it to the ground. In this second photo of these two Panthers, note the better view of the foliage placed around the Panther at the left. By running the branches from the ground up, it was possible to conceal the most distinctive parts of a tank, its suspension. This vehicle is exposed to have a better line of sight to see incoming enemy aircraft. The tank on the right appears to have a simplified form of the dotted "ambush" camouflage scheme. Though damaged, the front flip-up mudguards still have their Zimmerit coating intact. (BA)

Genl. D. Pztrp. Balck was forced to place 5. Panzerarmee on the defensive. Without reinforcements, there was no way his exhausted troops could prevail against a stronger and better supplied American force. The three divisions, four engineer battalions, artillery and dozens of new tanks and assault guns didn't exist and this sector was no longer considered important enough to warrant further men or equipment. The last units to move into Bures signaled the end of the Germans' offensive against the 4th Armored Division. Not only were the Americans much better equipped, but the Americans had learned the hard lessons of war, and now were well-led and much more aggressive in action. They had proved to be estimable foes, and at little cost, had achieved a clear victory. 4th Armored Division was put into a defensive posture for a time, remaining in its location around Arracourt. It was later relieved and sent to the rear. As the Panthers moved through Bures, the Americans were refitting and preparing to hold their lines. The Panther to the right was one of the tanks withdrawing from the fighting on the Bathelémont plateau. In this view, note the very extensive foliage on the Panther in the background. Parked in a tree line, this tank would have been very hard to see. Since the Americans could not maintain constant air cover, the Germans managed to move large amounts of materiel when the fighters weren't around. (BA)

On 22 September. The Allied high command decided to initiate a push to liberate Antwerp in Belgium to finally give the Allies a deep water port. This required reducing support for the drives in the southern part of the French campaign, and Patton's Third Army was directed to go to the defensive. This decision would have no effect on the tail end of the fighting around the Bures area, but it did result in a more stable sector. The German high command had also changed its focus. "Wacht am Rhein," the huge offensive in the Ardennes, now occupied the time of the senior German commanders. The requirements for the massive undertaking resulted in the best units on the Western Front being pulled back and replaced. This reduction of forces was the final blow to any possible German drive in this area. The 3. And 15. Panzergrenadier Divisions were still in reasonably good shape, so they were relieved. All the staffs from 5. Panzerarmee, XXXXVII Panzerkorps and LVIII Panzerkorps were also relieved, and replaced by the LXXXXIX (99.) Armeekorps. During the final stages of the campaign, Bures was the town where the various German divisions passed through on their way to parts of the campaign area. These Panthers of 11. Panzer Division are seen here passing by a farm in Bures, part of the town that had not been destroyed by the U.S. fighter-bombers. Both vehicles are in the three-color camouflage scheme. (BA)

The campaign to turn the flank of Patton's Third Army had failed. The primary result had been the destruction of most of the armor reserves available to the Wehrmacht in the French sector of the Western Front. Well over 150 valuable tanks, many of them Panthers, were lost, and many more damaged. Von Rundstedt was forced to fight a defensive war on a broad front with a total of 500 tanks and assault guns. That the Americans may not have realized how large their victory had been did not reduce its effect on German fortunes. This is another photo of the two Panthers in the previous view. Although all appears calm in these two photos, other shots from the same roll indicate heavy air-to-ground activity only a few hundred yards from this position. At the end of the fighting, Panzerbrigade 111 was disbanded and its tanks and armored vehicles turned over to 11. Panzer Division. There were only 20 Panthers and 10 PzKpfw IVs left in the brigade to deliver to 11. Panzer Division. The men in the brigade were then assigned to other units or sent to replacement centers to be assigned to still other groups. Such was the end of many of the smaller German fighting units. Sometimes even Panzer and Panzergrenadier Divisions suffered the same fate, though most of these were rebuilt from other formations and retrained. For the men of Panzerbrigade 111, the Alsace-Lorraine campaign was the end of their unit. (BA)

kleines Kettenkraftrad SdKfz. 2

The Kettenkrad stands out as, perhaps, one of the most unique vehicles developed during the Second World War. The "tracked motorcycle" concept was conceived and patented by a German inventor, Heinrich Ernst Kniep, in June of 1939. This was in response to a request for light vehicle capable of moving small loads in mountainous terrain.

The NSU Werke of Neckarsulm, Germany developed the Kettenkrad. Interestingly, many of the O-series prototypes used spoke wheels, not only in front, but also throughout the tracked portion of the vehicle and its attendant trailer. Trailers for the Kettenkrad were a concurrent development and are discussed later in this article. Although the concept was embraced immediately, the vehicle was not introduced to troop service until early June of 1941. The official designation was "kleines Kettenkraftrad SdKfz. 2." "Kettenkrad" became the common abbreviation soon after.

Production was eventually expanded to the Stöwer Werke and by war's end over 8,000 vehicles had been produced (although some sources state a lower figure). The French firm of SIMCA and NSU shared the licensed production of the Fiat Topolino car, and as a result, there was some discussion about adding SIMCA to the production stream, but this did not take place.

Production at the NSU Werkes is said to have continued until 1948 with some vehicles being imported into the U.S. to see use with the Forest Service. Details of this are sketchy. At least one (possibly more) French company offered rebuilt versions of discarded Kettenkrads after the war. These had the front wheel and steering gear removed and other modifications, to create a small farm tractor.

There were two sub-variants of the Kettenkrad, SdKfz. 2/1 "kleines Kettenkraftrad für Feldfernkabel" and SdKfz. 2/2 "kleines Kettenkraftrad für schwere Feldfernkabel." Both vehicles were used in conjunction with a trailer and had field communication wire spools mounted behind the driver. The 2/1 vehicle mounted a small wire spool and frame similar to the backpack piece used by the infantry. The 2/2 utilized much larger spools, two of which were mounted on a frame behind the driver. Additional spools were mounted in a specialized trailer (Sd.Ah. 1). Late in the war, portions of the Kettenkraftrad suspension were used to create the "Springer" demolition vehicle. This was designed as a replacement to the Borgward series and NSU (only) produced about 50 of these vehicles by war's end. **Above:** these two happy gents take their new Kettenkrad for a spin in the Russian countryside. This shots gives an excellent impression of the interleaving suspension and tracks. The license plate indicates Luftwaffe and the quilted cotton winter uniform further indicates that they are members of a Fallschirmjäger unit. This uniform was specifically issued to these units and was grayish-green on one side and white on the other. Their Kettenkrad still retains the foul weather cover mounted on the front of the handlebars. The driver utilizes the cold-weather gauntlets designed for motorcycle riders. (BA)

Another Luftwaffe vehicle. This may be an anti-aircraft unit as evidenced by the Flak 18 set-up in the background. Here, the vehicle is picking up some speed. When traveling this fast, the Kettenkrad's tracks barely touch the tops of the roadwheels. Although markings were usually sparse on the Kettenkrad, this vehicle contains three. The numeral 5 appears in a circle on both the front and rear of the vehicle, as well as the standard loading/shipping label. This label was commonly stenciled on the sides of soft skins and other vehicles. It contained pertinent information for both the shipping and use of the vehicle. The first line would contain the SdKfz. number and in this case reads, "Sd. Kfz 2." The next line reads, "Leergewicht 1235 Kg" (all weights were metric). This denotes the weight of the vehicle while empty (approximately 2,717 pounds). The third line reads, "Nutzlast 325 Kg." This denoted the useful load capacity (approximately 715 pounds). The fourth line reads, "Anhängelast 450 Kg" and this indicates the towing capacity (approximately 990 pounds). Often the stencil included a final line that read, "Verl. Kl." This was normally followed by a blank space and was meant to indicate any additional equipment provided with the vehicle. Occasionally, these stencils contained no numbers. Figures would be chalked in as the vehicle made its way along the logistics chain. (BA)

True to its intended role, the Kettenkrad was popular among troops serving in hilly or mountainous terrain. This vehicle is serving with a Fallschirmjäger unit in Italy during the spring of 1944. Because of its wide use, the Kettenkrad often took quite a beating from the troops. This vehicle is missing its headlight assembly as well as several of its rubber track pads. The folded metal brackets located to each side of the steering column are tow hooks. The hook portion on both has broken off. This appears to be a problem with many early Kettenkrads. Later vehicles had more robust, cast tow hooks located on the front of the superstructure. Among the trailers used with the Kettenkrad, this specialized version of the standard Infantriekarre lf.8. trailer was extremely popular. The standard cart could be fitted with a curved yoke for towing, a t-shaped bar for hand pulling, or a double-bar arrangement for use with a horse. This particular trailer is loaded with mortar rounds. This photo provides a good view of the brake assembly of the trailer, which was the primary difference between it and the standard cart. Brakes were a true necessity for a trailer loaded with anything close to its rated capacity. (BA)

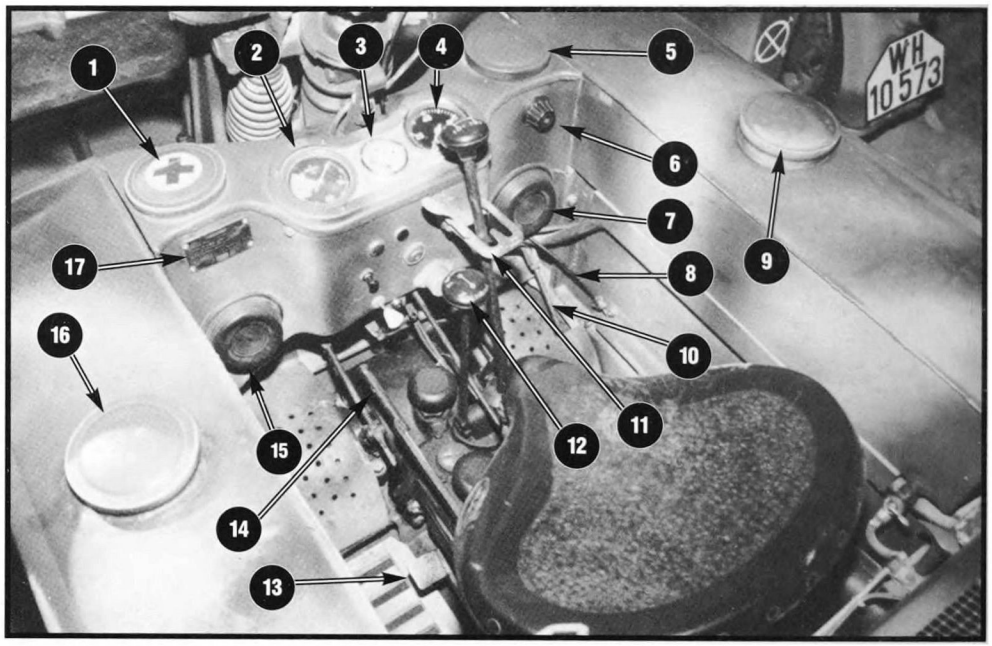
This Kettenkrad negotiates a snowy and muddy track somewhere in the Caucasus during the winter of 1942. This vehicle belongs to either to 1. or 4.Gebirgs-Division, both of which served in that area at that time. The "edelweiss" marking visible on the front left fender and the rear body panel is of interest. It is very similar to the insignia embroidered on the Gebirgsjäger cap. The numeral 3 is also seen on the side body panel. The NSU logo is barely visible just to the left of the numeral. The lack of front marker lights indicates an earlier vehicle. This Kettenkrad pulls the standard Sd.Ah 1 trailer filled with what appears to be bags of grain. This version was the most numerous of the five types produced. The O-type was only used in conjunction with the prototype and used the highly impractical spoke wheels. The load bearing wheels on this vehicle are completely clogged with mud and have been rubbed smooth by the outer roadwheels. (BA)

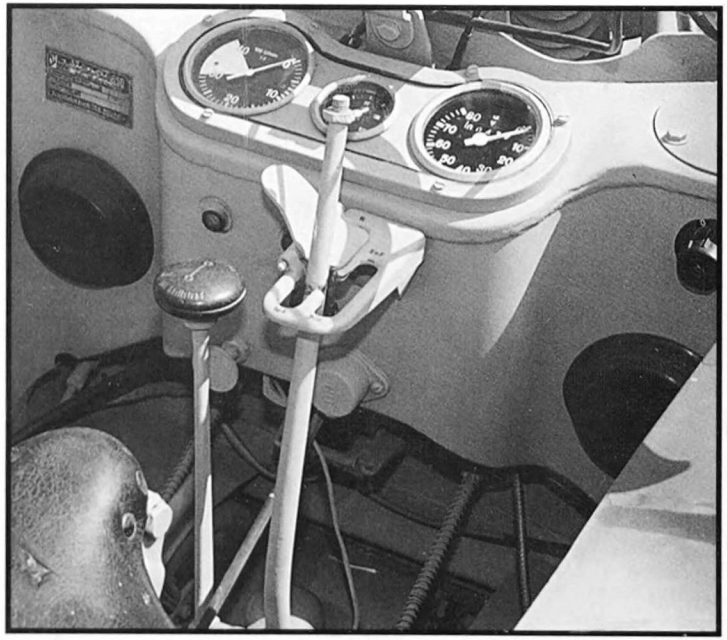
Above left: this shot is from the same general sequence as the previous photo. Also note the lack of front marker lights on this Kettenkrad. (BA) **Above right:** this Kettenkrad is serving with a Kradschützen unit in the Deutsche Afrika Korps. It was possible to operate the Kettenkrad in this condition as the steering brakes were actuated as soon as the forks were moved more than 5cm from the center position. The front wheel actually only steered the vehicle in gentle turns. Every square centimeter of rubber track pad has worn away on this vehicle, revealing the metal bases. It is surprising that the tracks still function in this condition. Even though the inner track link sleeves were sealed, maintenance could still be a bear on these types of tracks. Each link contained over twenty parts. This vehicle tows what appears to be a modified trailer from a 2cm-flak gun. (BA) **Below left:** this is a good example of why the track pads were worn off in the previous photo. The super fine sand thrown up by every movement was not healthy for any machine. (BA) **Below right:** changing a tire was much simpler and was just like changing any standard motorcycle or bicycle tire of the time. The wheel was quite simple and it consisted of two pieces of pressed steel welded together. The center hub was more complex and consisted of an inner and outer axle and a central shaft that housed a bearing race for each side of the wheel. (BA)

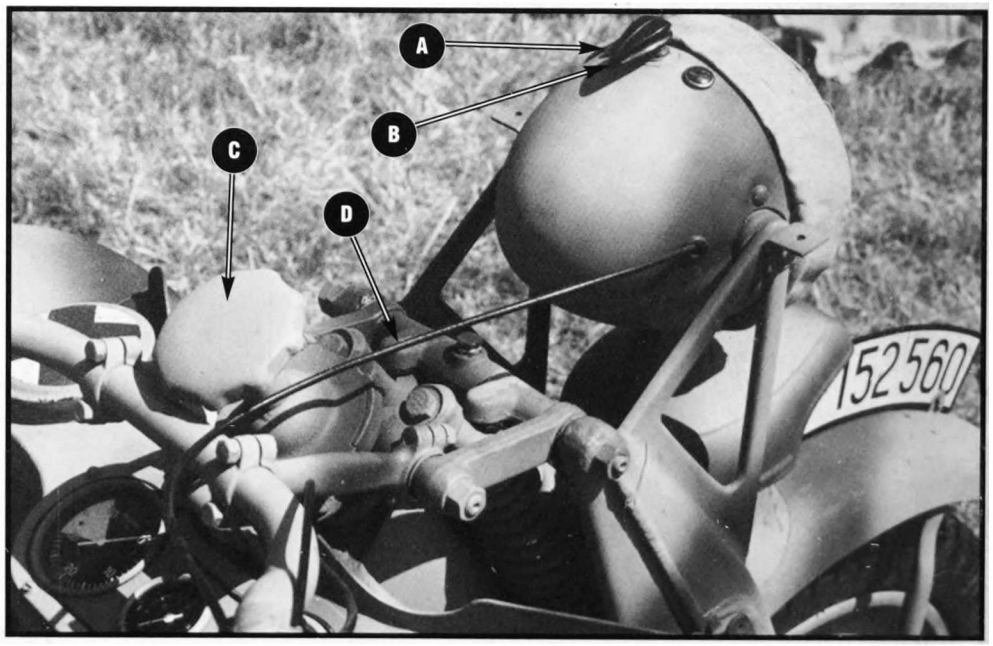
In a scene reminiscent of the film "Saving Private Ryan," 101st airborne troopers make good use of their newly acquired Kettenkrad and a captured stock of German gasoline in the French town of Carentan. The Kettenkrad was every bit as popular with allied soldiers as it was with the Germans, perhaps even more so due to its novel and unfamiliar design. There is plentiful photographic evidence of the vehicle being used by American, British and Commonwealth soldiers. There are even instances of Kettenkrads being repainted and remarked by the Americans. This vehicle sports several interesting features, including the late-style filled side-rails. Also compare the shape of the rear center partition with the other vehicles shown in these pages. The two soldiers riding in front are clearly airborne. Their heart-shaped helmet insignia mark them as members of the 502nd PIR of the 101. The soldier filling the gas cans is most likely part of the 327th glider regiment. Note the pockets on his jacket and the lack of airborne insignia on his shoulder. These two units (3rd battalion of the 502nd) were tasked with taking Carentan and linking the Omaha and Utah beachheads. Their opponents were the Fallschirmjägers of Kampfgruppe von der Heydte. The presence of civilians on the street of this rather battered Normandy town indicates that the fighting has moved further to the east, sometime after June 12th. (NA)

This photo depicts another example of a captured Kettenkrad. This unit is missing its front fender, along with the Notek light and headlamp. The vehicles' new owner has added a new light to the top of the handlebars. Lest any question about the Kettenkrad's ownership arise, the rider has added his name to the blackout flap of the light. The NSU placard can be seen clearly on the front right side of the bodywork. (NARA)

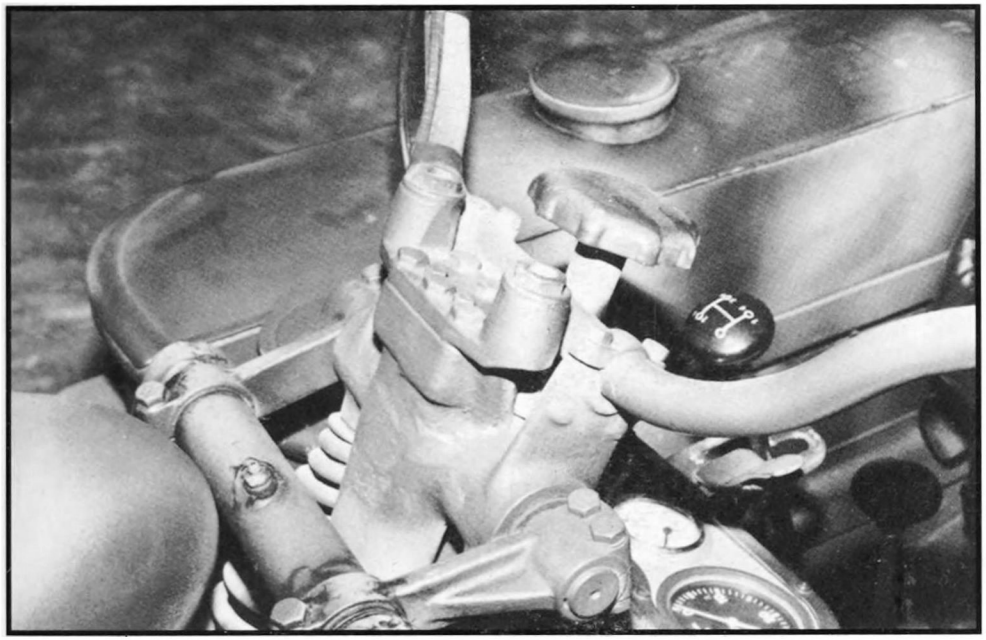
A surprising number of Kettenkrads survived the war. The vehicle was extremely appealing for anyone regularly traveling over rough terrain. Farmers, hunters and even resort owners made use of the Kettenkrad during the post-war period. The high-quality replacement parts that were created for the Kettenkrad by its owners after the war extended the life of the vehicles even more. And so many vehicles have now been restored to their original condition. This Kettenkrad was photographed at the IMPS War & Peace Military Vehicle Show in England in 1999. This shot provides an excellent view of the suspension. The inner spoke wheels were the load-bearing wheels, while the outer wheels extended the ground pressure and contact with the tracks. Very early Kettenkrads had wheels with eight metal spokes in the inner positions as opposed to the six spoke wheels seen here. This Kettenkrad has the later tow hooks located towards the bottom of the front body panel. This photo also provides a good view of the protective flap behind the steering column. Note the three wires leading from the right handle bar. The wire on the face of the bar was connected to the handgrip and this rotates to increase or decrease acceleration. The wire attached to the button on top of the bar leads to the front light and switches it on or off. The wire leading from behind the bar actuates the horn.

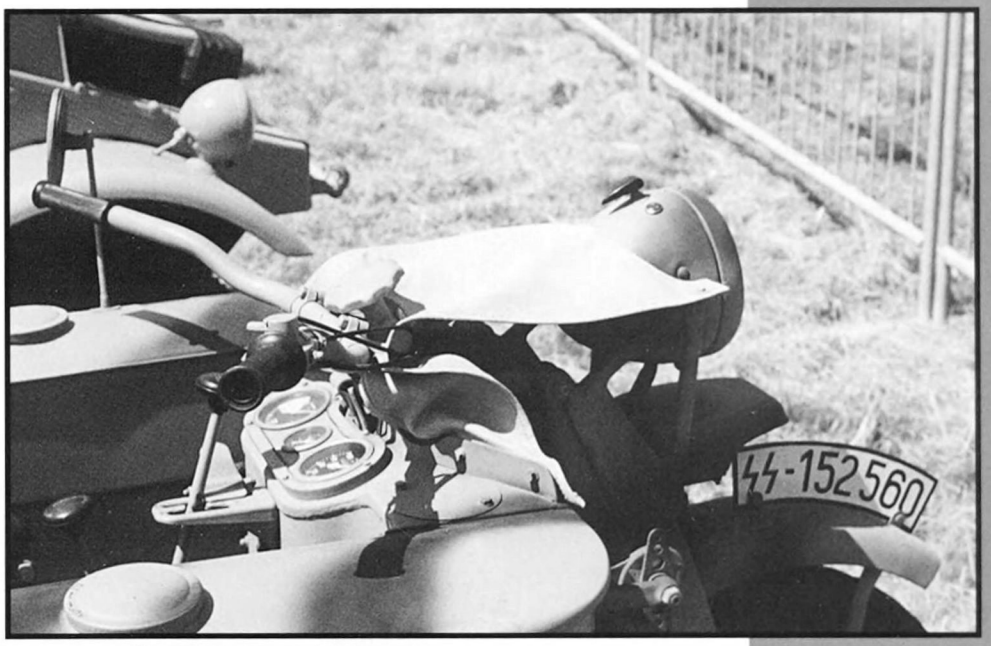


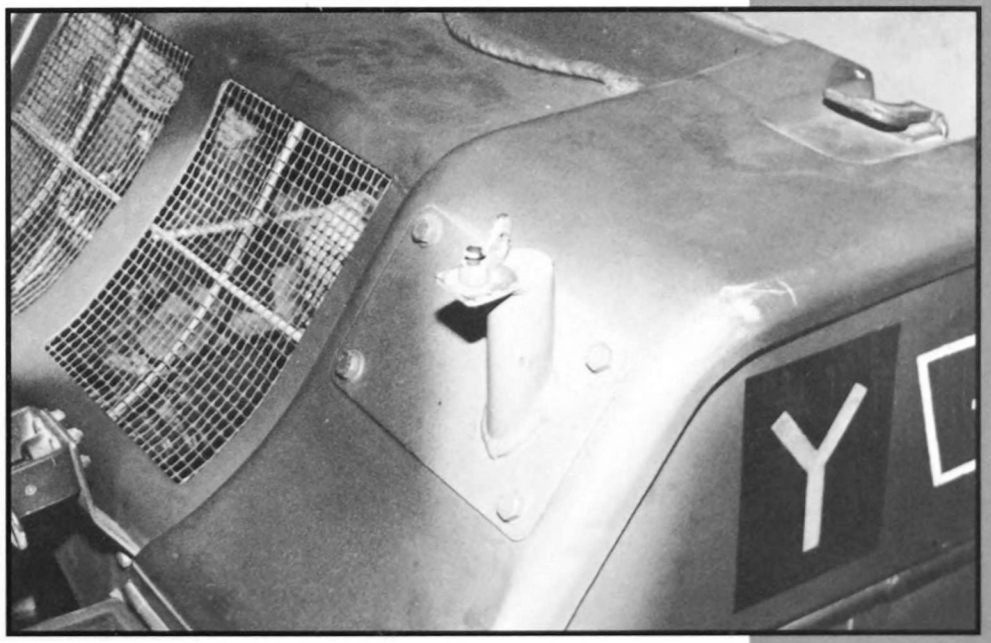




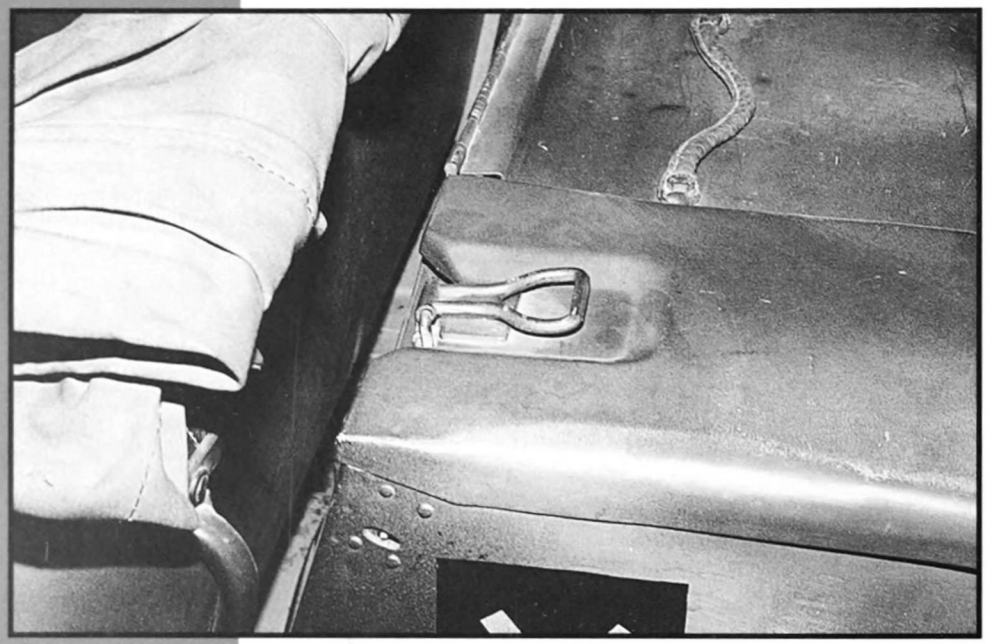
Top left: this Kettenkrad is currently located at the Bundeswehr museum at Münsterlager. The vehicle has been restored, but it does contain a few inaccurate details. For example, the track pads are not original, nor is rear taillight. The socket for the trailer light lead can be seen just above the light. **Top right:** an overview of the Munster vehicle's driving compartment. This is a good example of why the Kettenkrad was referred to as a "tracked motorcycle." The driver sat on a standard saddle and the controls were laid out very much like a motorcycle. 1) First-aid kit container. 2) Tachometer. 3) Temperature gauge. 4) Speedometer. 5) Tool kit compartment. 6) Driving light switch. 7) Right rubber kneepad. 8) Accelerator cable. 9) Right fuel tank filler cap. 10) Brake lever for right wheel. 11) Gearshift lever. 12) Control lever for auxiliary transmission. 13) Clutch pedal (brake pedal on opposite side). 14) Hand brake. 15) Left rubber kneepad. 16) Left fuel tank filler cap. 17) Factory ID plate. **Above left:** this closer view of the controls, shows the instrument cluster and the gearshift gate. The tab on the gate is to prevent the reverse gear from being thrown back too far. **Above right:** the top of the handlebars. A) Headlight switch. B) Battery indicator light. C) Steering damper knob. D) Power cable for headlight. Note the reinforcing rib on the front forks.

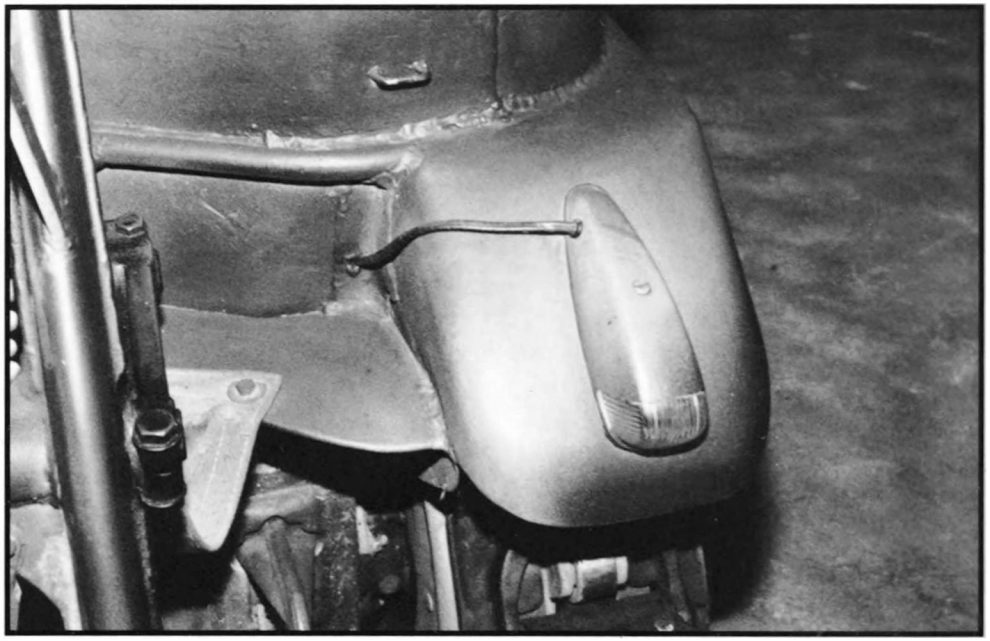


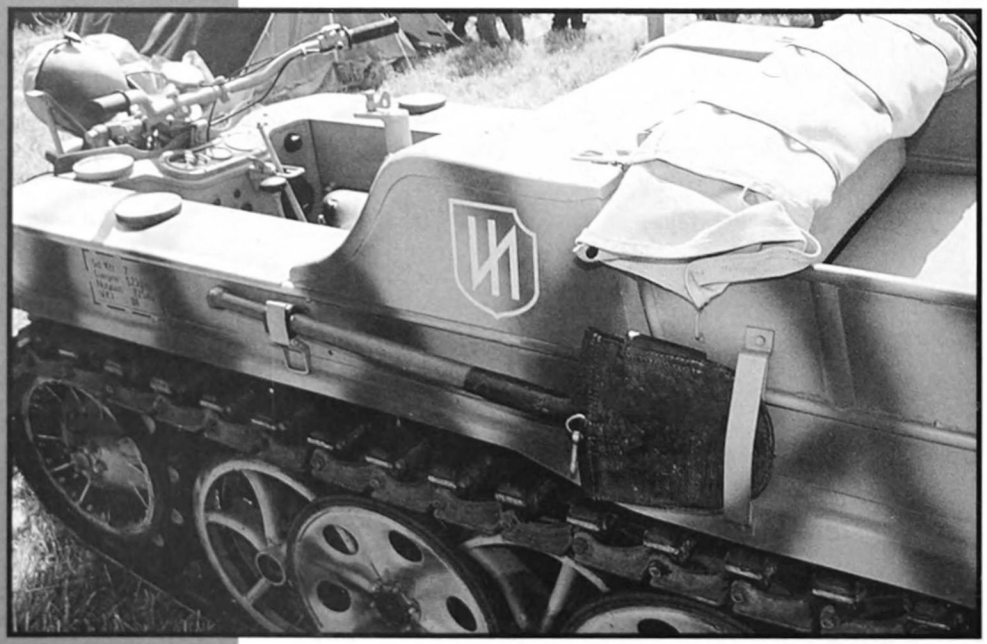


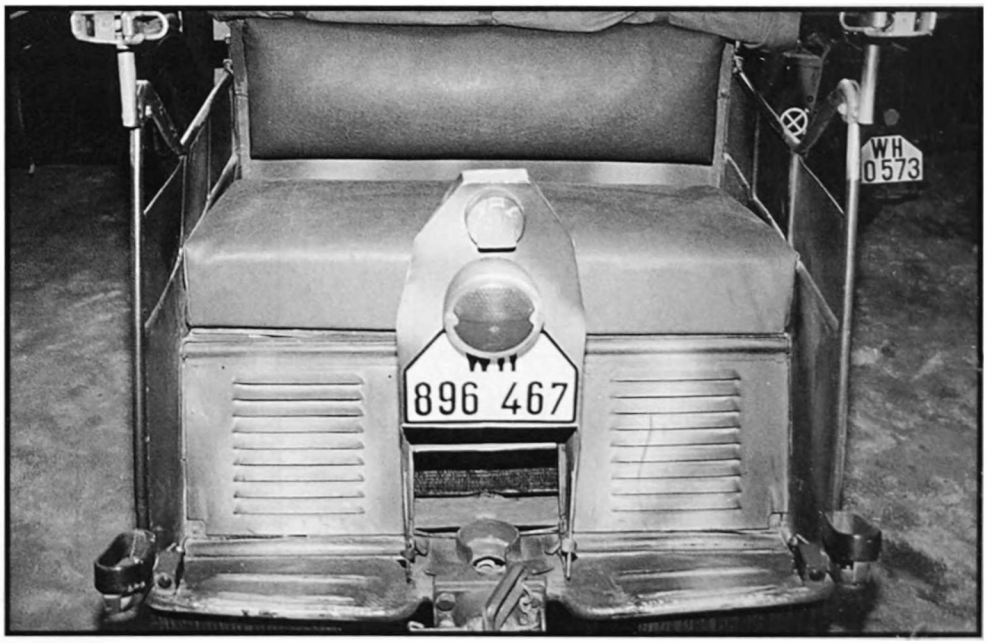


Top left: a closer view of the top of the steering column, showing the damping knob and the cast portion of the assembly. **Top right:** this is a replacement canvas cover for the top of the steering column. Note how it fastens to brackets on each side of the headlight. These brackets can be clearly seen in the photo on the lower right of the previous page. This particular cover is newly made and is missing the small hole in the upper right side for the light cable to feed through. **Above left:** two rifle racks are installed in the driver's area of this Kettenkrad. The clasp seen here corresponded to an oval sleeve on the floor of the vehicle. Two similar racks are installed on the rear of the Kettenkrad. Early vehicles were missing these details. This shot also provides a close-up view of the standard motorcycle saddle installed for the driver. **Above right:** this post and bracket was used to install another canvas cover over the driver's compartment. It was also a handy place to hang equipment from. The mesh for the engine compartment can also be seen here.









Top left: this is one of two clasps used to secure the engine access door. The canvas cover for the passenger area can be seen at left. **Top right:** the left side front marker light and its cord. The bottom attachment point for the steering column cover is also seen, as well as the very top of the front cast towing bracket. **Above left:** provision for a shovel was not part of the factory equipment of the Kettenkrad, but it is highly possible that it could have been done at the unit level workshops. This is another contemporary, restored vehicle. **Above right:** the back end of the Münster Kettenkrad. Both the seat bottom and the panels beneath it were removable for access to the engine and cooling system.

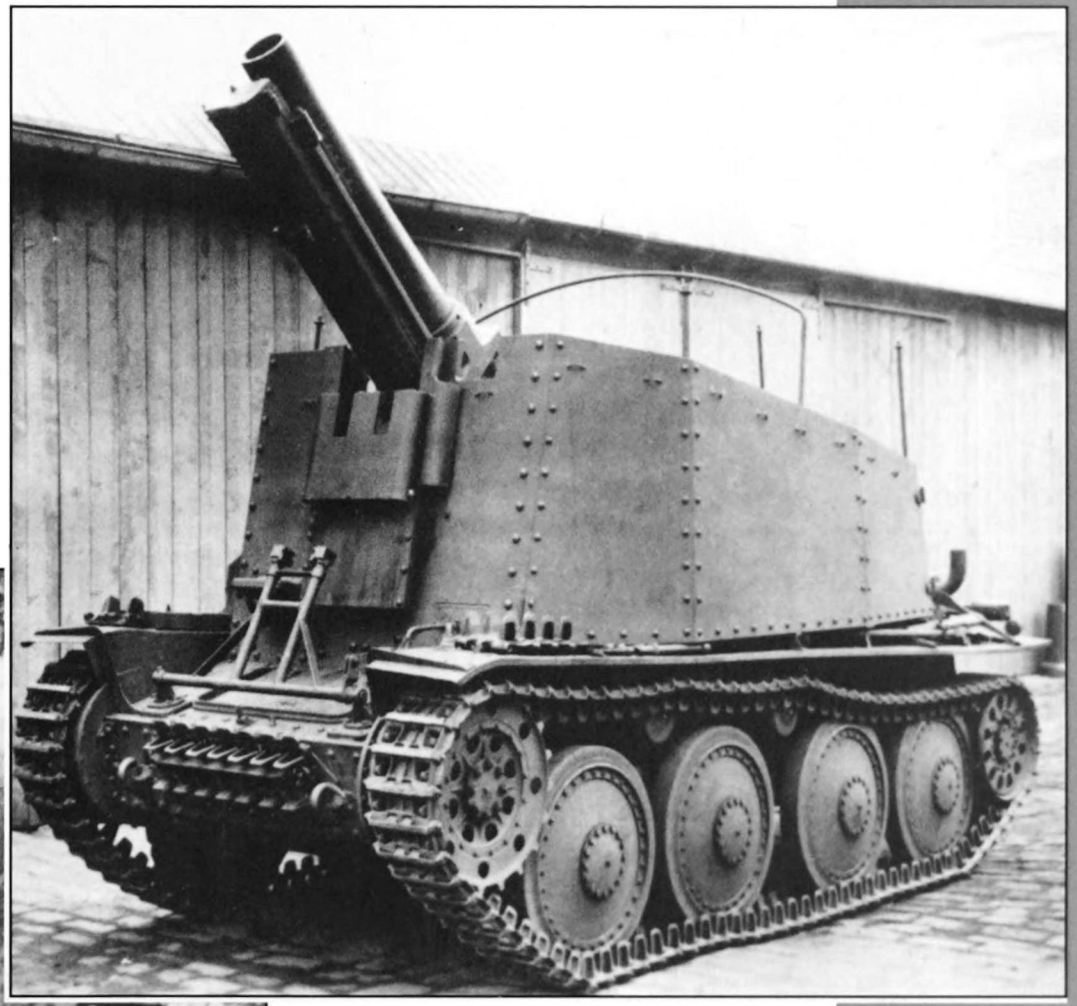
The in-line 4-cylinder Opel engine faced towards the rear of the vehicle and the housing for the radiator is just beneath the seat cushion. The driver could regulate the amount of air reaching the housing via the small door seen below the license plate. This door was controlled via a cable and a small lever on the left side of the driver's compartment. This shot affords a good view of the rear trailer light socket. Also note the small rectangular objects at the very bottom corner of the rear compartment. These are the rear taillights. There appears to be some variation in the shape of the center housing from vehicle to vehicle (disregard the rear marker light).

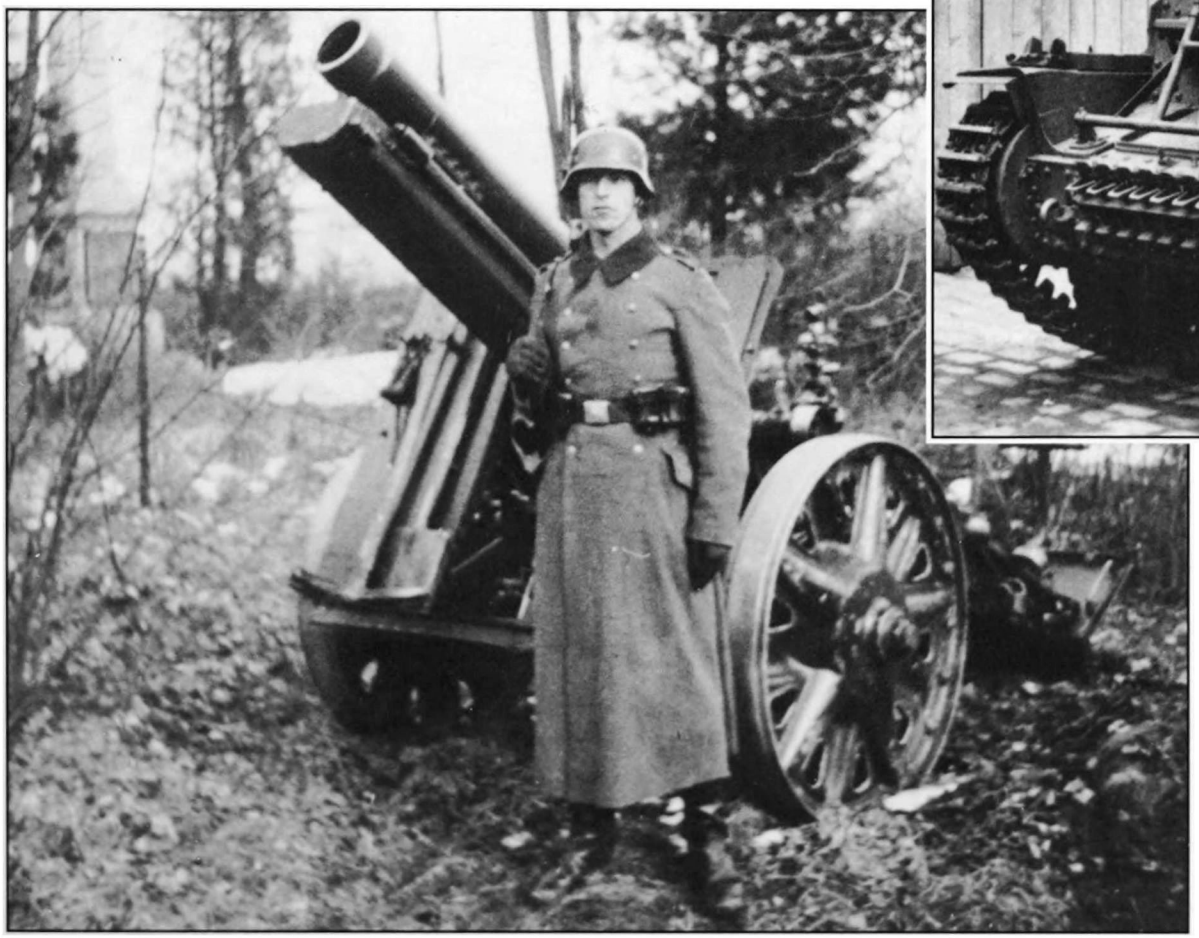
The sIG 33/1 Grille SPG

The Grille self-propelled gun was a unique and very versatile development. Its roots can be found in the early stage of the war, when the Pzkw 38 (t) light tanks were withdrawn from frontline service due to their then limited battle value.

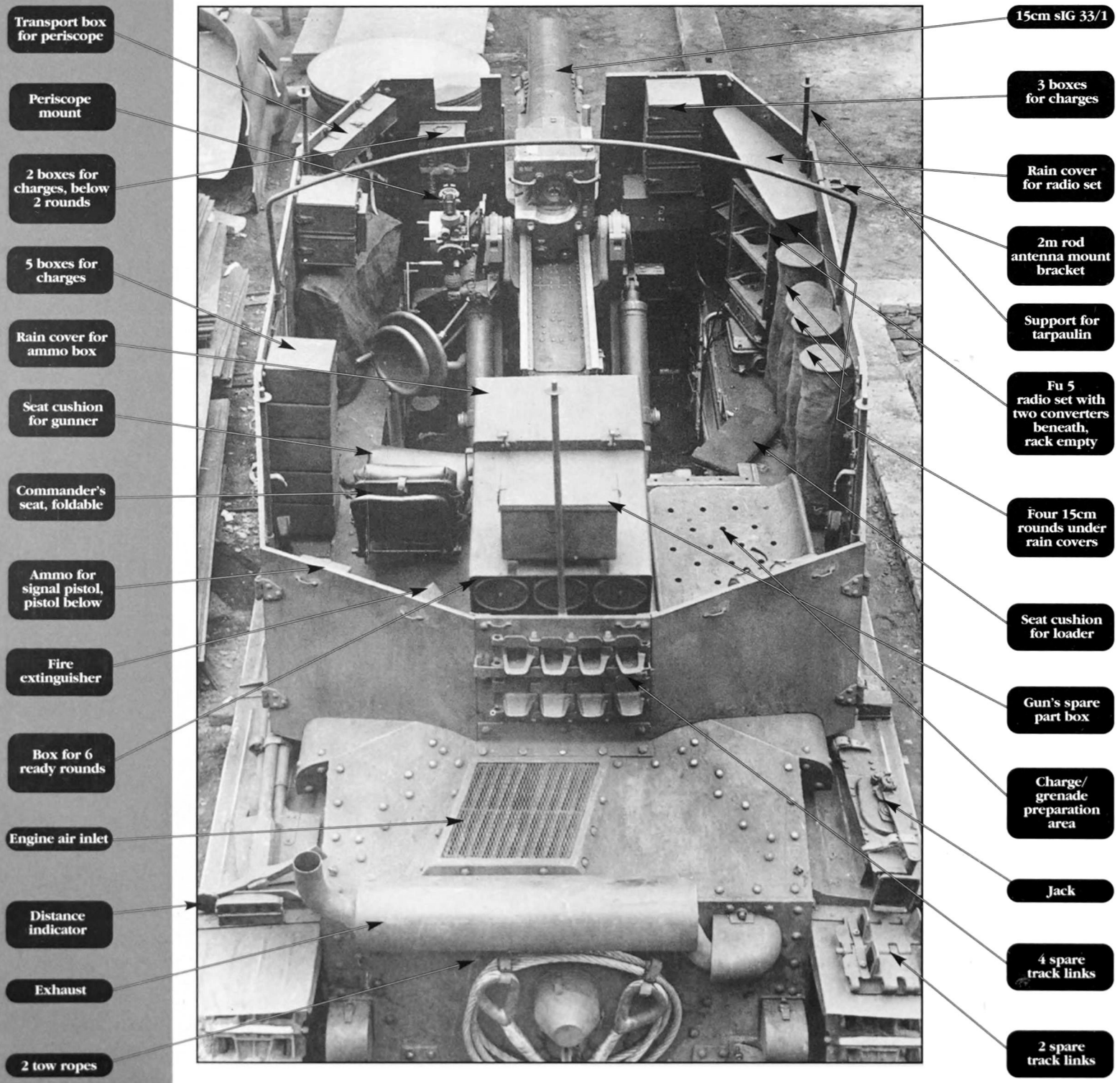
In the early 1930's, in response to the requirement for a heavy direct support weapon for infantry units, the firm of Rheinmetall designed its medium howitzer. Despite the large caliber of 15 cm, it was classified as an infantry gun. Designated as 15 cm sIG 33 (schweres Infanteriegeschütz), it was introduced in 1936. Principally, two versions were built. Ausf. A had a full steel carriage and Ausf. B, which had a composite steel /alloy carriage to save weight. Both versions were produced either for horse drawn (15 cm sIG 33) or motor drawn (15 cm sIG 33 (Kfz)). The versions B, C, D were prototypes with only a few samples built.

The sIG was a conventional gun, consisting of a massive one-piece carriage with two large wheels. It was designed for both flat and high trajectory to meet all requirements of the





Above: the first prototype of the sIG 33 (Sfl 38) Grille produced by BMM. The vehicle is still finished in plain matte dark gray. At the rear of the superstructure a support beam for the fragile fender is fitted, a detail later dropped. Note also that the front plate shows a rectangular opening at the lower right edge, which was welded tight. The gun is near maximum elevation, the spring assisted protective plate below following its movement. The two cut-outs were dropped with series production vehicles. The vehicle shows some further differences to the later Grille. A Notek light mount is visible on the fender. The location of the jack was different, it's place being occupied by some extra track links. (Photo Netik) **Left:** a photo of the 15 cm sIG 33 taken before the war. This is probably the Ausf. A with massive steel wheels originally intended to be horse drawn. The Rundblickfernrohr 38 periscope is mounted onto the Richtaufsatz. A shovel and a pick-ax are mounted on the gun shield, a detail seldom seen. The color of the gun is Panzergrau, a very dark color. This tone was not dull, note the sheen on the wheel. (Photo Seeler)


Transport box for periscope
Periscope mount
2 boxes for charges, below 2 rounds
5 boxes for charges
Rain cover for ammo box
Seat cushion for gunner
Commander's seat, foldable
Ammo for signal pistol, pistol below
Fire extinguisher
Box for 6 ready rounds
Engine air inlet
Distance indicator
Exhaust
2 tow ropes
15cm sIG 33/1
3 boxes for charges
Rain cover for radio set
2m rod antenna mount bracket
Support for tarpaulin
Fu 5 radio set with two converters beneath, rack empty
Four 15cm rounds under rain covers
Seat cushion for loader
Gun's spare part box
Charge/ grenade preparation area
Jack
4 spare track links
2 spare track links

infantry. The gun was able to fire HE, smoke and AT rounds at ranges between 1,000 and 4,700 meters. All standard fuses were available. The muzzle velocity was low, 210 meters per second with full charge, 125 m/s with lowest charge. An exceptionally remarkable projectile was the 15 cm Stielgranate 42. This fin-stabilized grenade was loaded right into the muzzle. With a maximum range of 1,000 meters, it was fired directly at strong points or mine fields.

With a weight of 1,750 kg (Ausf. B 1,550 kg) the sIG 33 was relatively heavy for an infantry gun. Rapidly taking up new positions was a difficult procedure. This insufficient mobility in immediate proximity of the line of fire was a constant problem. Any attempt to keep down weight was defeated by the shortages of alloy. Production of the weight-saving versions Ausf. C, D and E could never be commenced. Despite these factors, the heavy infantry gun was a successful and reliable design. Impact in the aim was regarded as sufficient and all range figures were within the requirements. The 15 cm sIG 33 was produced unchanged until the end of the war.

Organization

A standard infantry division (motorized) had one company of six sIG 33 in stock. For use with the rifle brigades of the tank divisions, a specialized SP gun was required. In 1939, six companies (s. Infanteriegeschütz

Left: a good view into the interior of the prototype. Compared with the later production vehicle, the location of the Fu 5 radio set is different. Accordingly, the boxes containing the charges were mounted in different places. Note the small fender support, which was mounted on the left side only. The right fender carrying the heavy jack had no reinforcement. The combustion air inlet was of the standard Pzkw 38 (t) type. (Photo Netik)

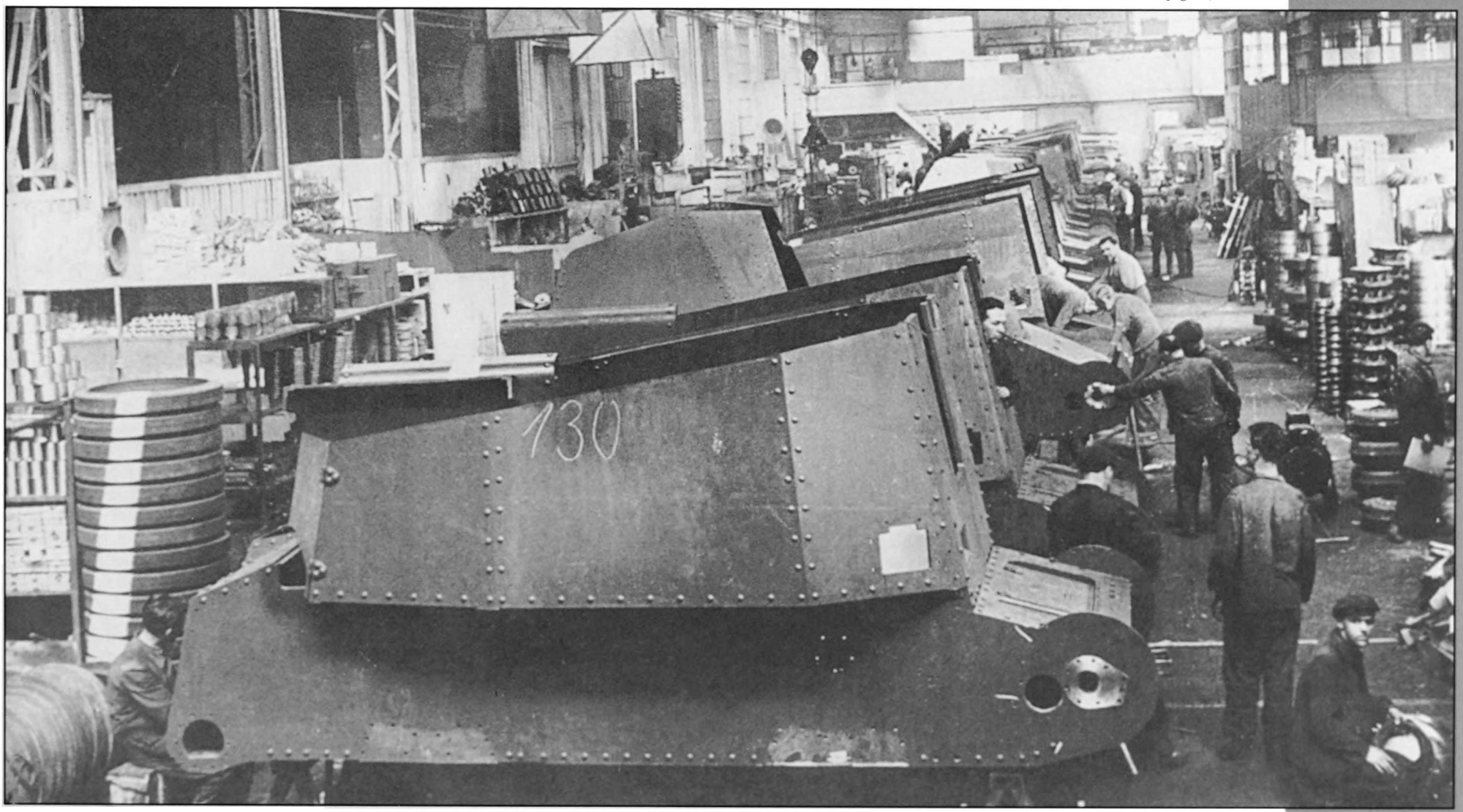
Kompanie (Sf.) Nr. 701 through 706) allocated to six tank divisions, received the sIG 33 mounted on Pzkw I/B hulls. Although these vehicles had limited battle value, they brought precious experiences.

The development of the Grille

The limited mobility of the sIG 33, normally drawn by the Demag 1-ton prime mover (Sd.Kfz. 10), did not come up to the character of the new, highly mobile units. Thus a self-propelled solution based on a fully tracked vehicle was required. The first of these early SP guns, based on the Pzkw I Ausf. B, resulted in an overstressed vehicle. A second batch was based on a modified Pzkw II chassis, with comparably poor results. Although these solutions did not fulfill their expectations, they showed both the advantages and necessity of fully tracked artillery SP guns.

When available in sufficient numbers, the Pzkw 38 (t) chassis was adopted for this purpose. As early as 1940, work started on mounting the sIG 33/1 (/1 = modified for usage with SP vehicles) on the chassis of this proven light tank. The firm of Alkett (Altmärkische Kettenfabrik), which developed many successful designs during the war, undertook construction of a prototype. In 1941-1942, when the chassis of the ex-Czech light tank became available in larger numbers, limited mass production was ordered. Between February and April of 1943 BMM in Prague produced 90 units of the first production batch,

(text continued on page 84)



Above: a view into the BMM production hall. Several unfinished Grille Ausf. H can be detected. In the background the prototype of the GW 38 is visible. (Photo Netik)

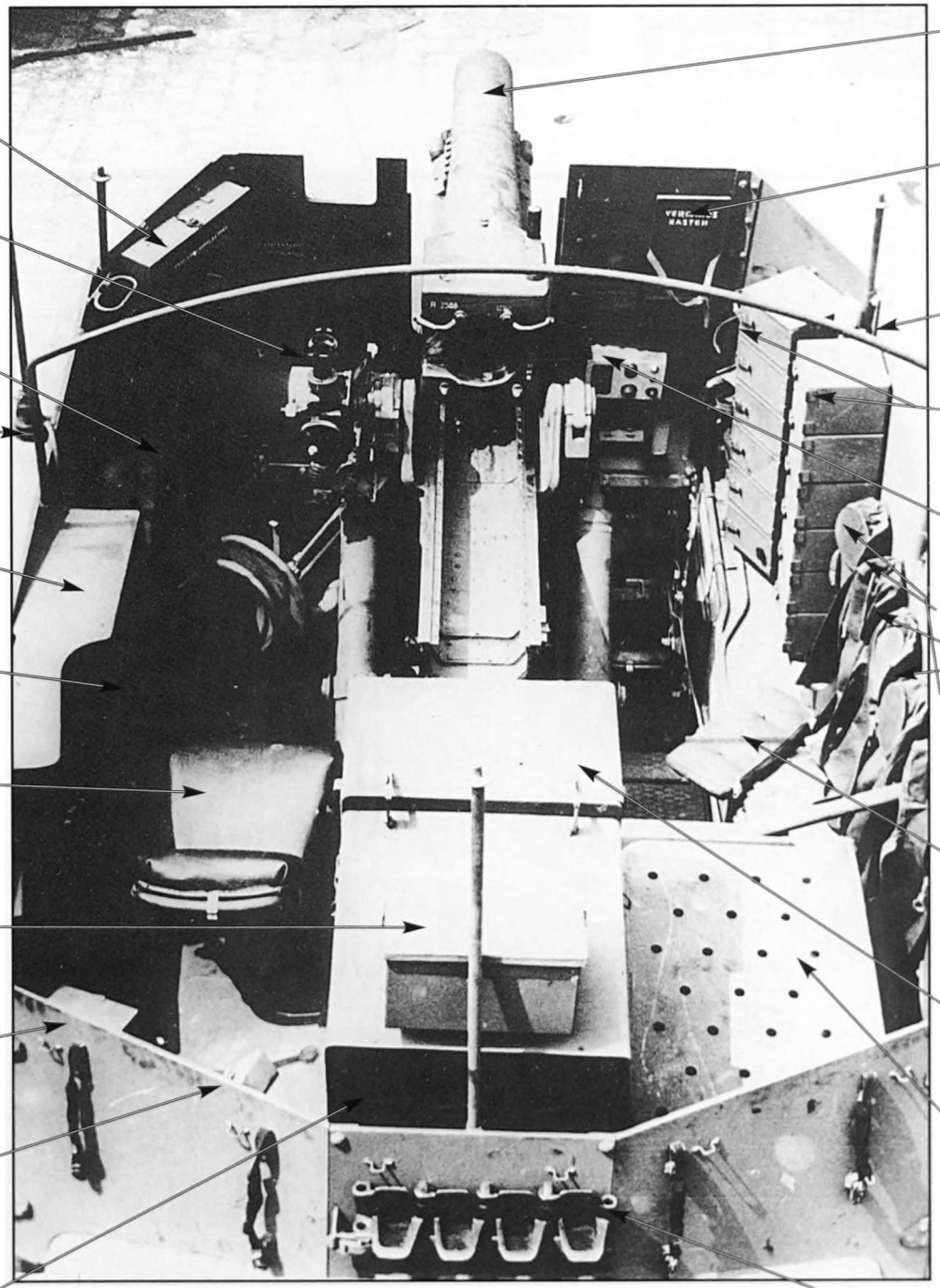
One of the first production vehicles. Still painted in dark gray, this "Grille" waits for delivery. The tools were relocated, the jack was now mounted on the left fender. The fender was less fragile here. Note that the color (Panzergrau) appears to be completely dull here. (Photo Netik)

the 15 cm sIG 33/1 Grille Ausf. H.

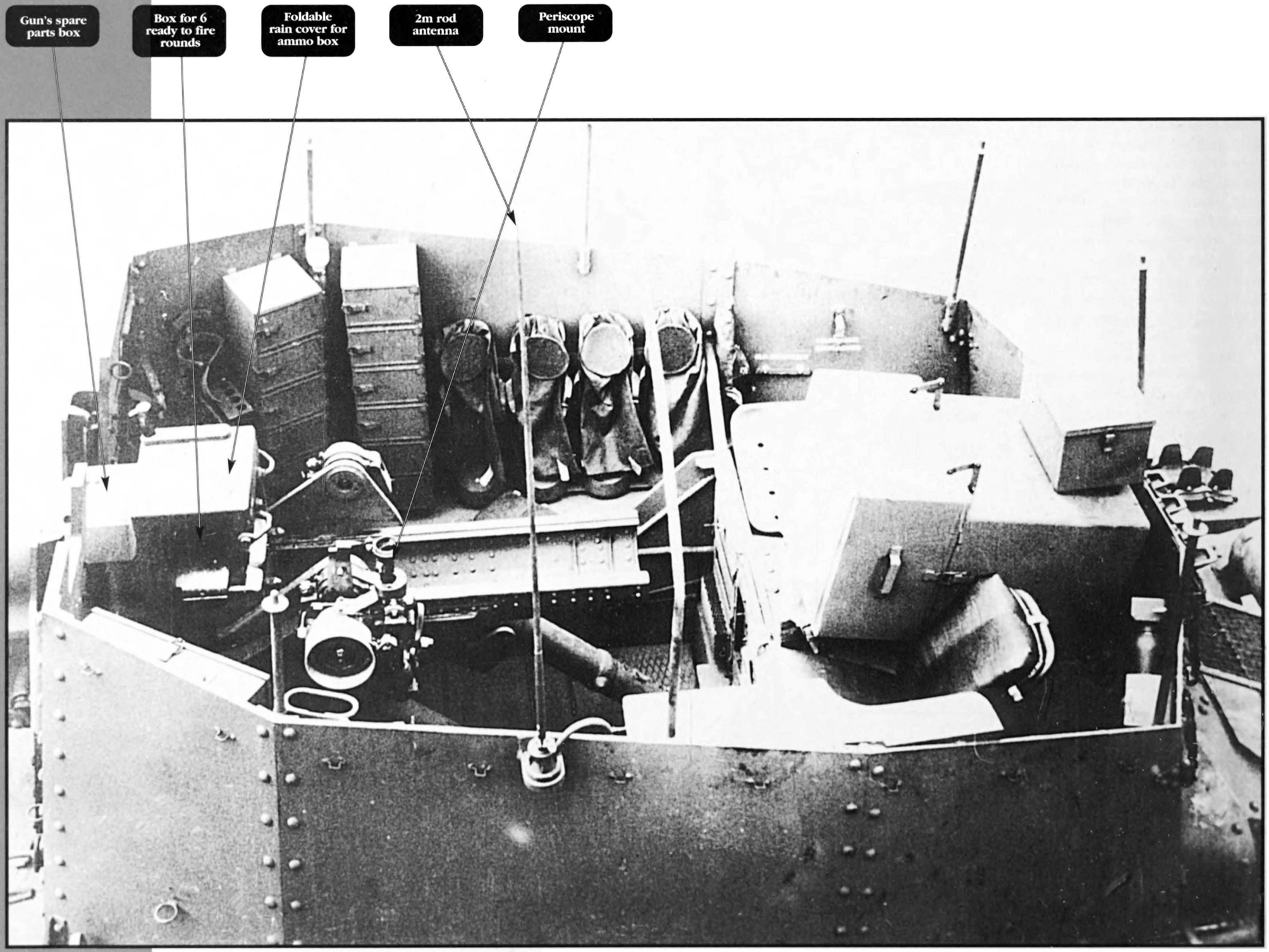
The superstructure of the Pzkw 38 (t) chassis was partly removed and the sIG 33/1 was mounted in the center of the vehicle upon a massive trestle. This had a V-shaped reinforcement on the bolted chassis floor. The drive shaft led between this reinforcement to the transmission in the front. A tread plate covered this arrangement. Around the gun a simple, armored box-like superstructure was fitted, which was open at the top. The driver's seat remained very close to the gun, not a very comfortable place. The wireless operator's seat to the left was removed, leaving space for personal gear.

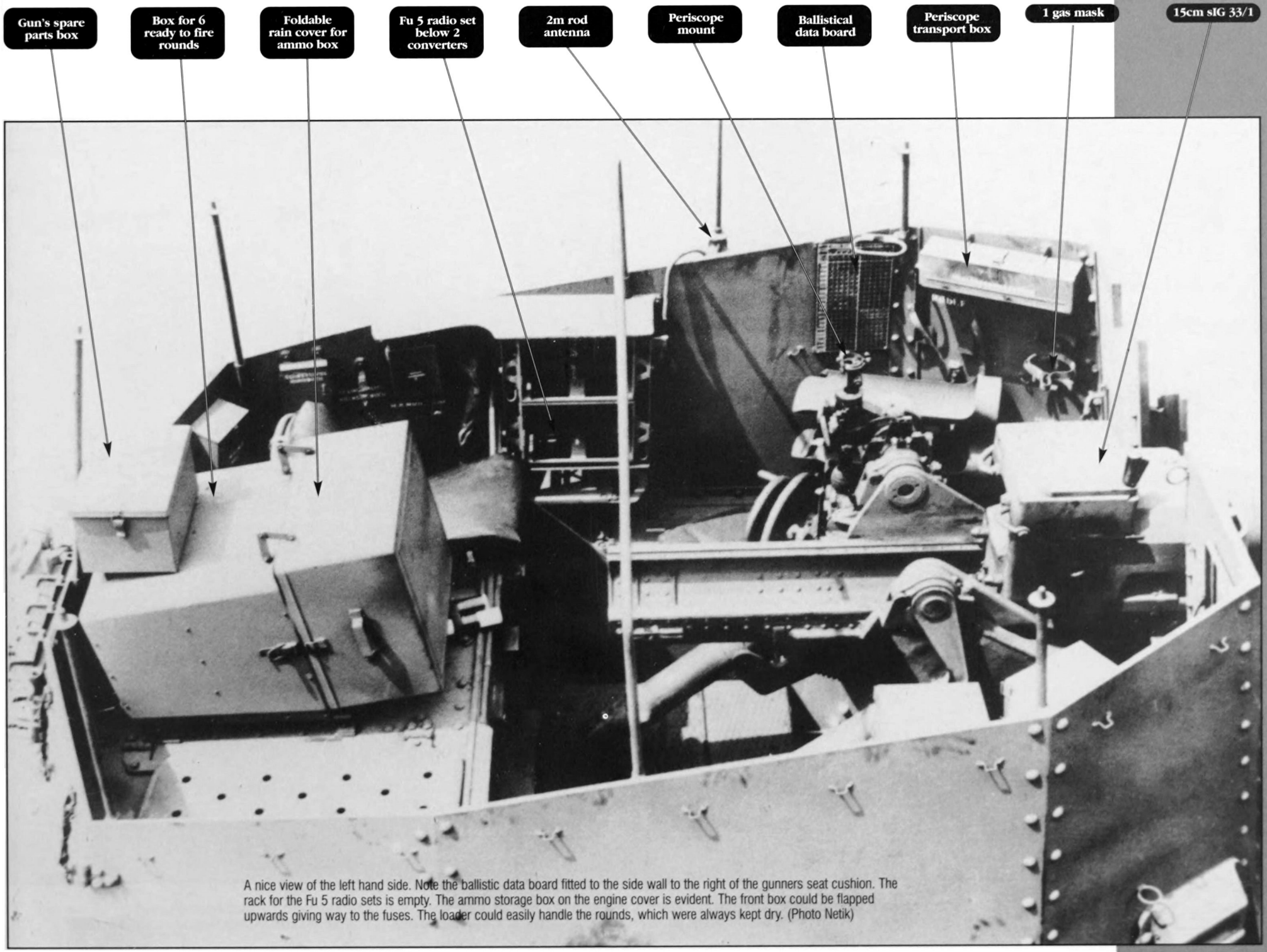
Three men crewed the fighting compartment and their arrangement changed during development (see photos). Series production vehicles had the "Geschützführer," the commander, being seated at the extreme left rear on a folding back seat fixed upon the engine cover, with the wireless mounted to his left. From here he could survey the vehicle's interior quite easily. Additionally, he had an intercom to contact his crew. The K1 (Kanonier 1), the gunner, had a simple seat cushion to the left of the gun's breech. He was responsible for operating the gun's sighting device and traverse/elevating mechanism. He furthermore had to release the gun from the travel rest with a large lever. To the right of the breech, the K2 (the loader) was situated on a seat cushion. He handled the different types of grenades, packed the cartridges and set and fixed the fuses according to the commander's orders.

According to the technical manual D 2025, the Grille Ausf. H carried 10-12 grenades. When carrying out special missions, the vehicle could be loaded with up to 19 grenades. This was allowed only in emergency

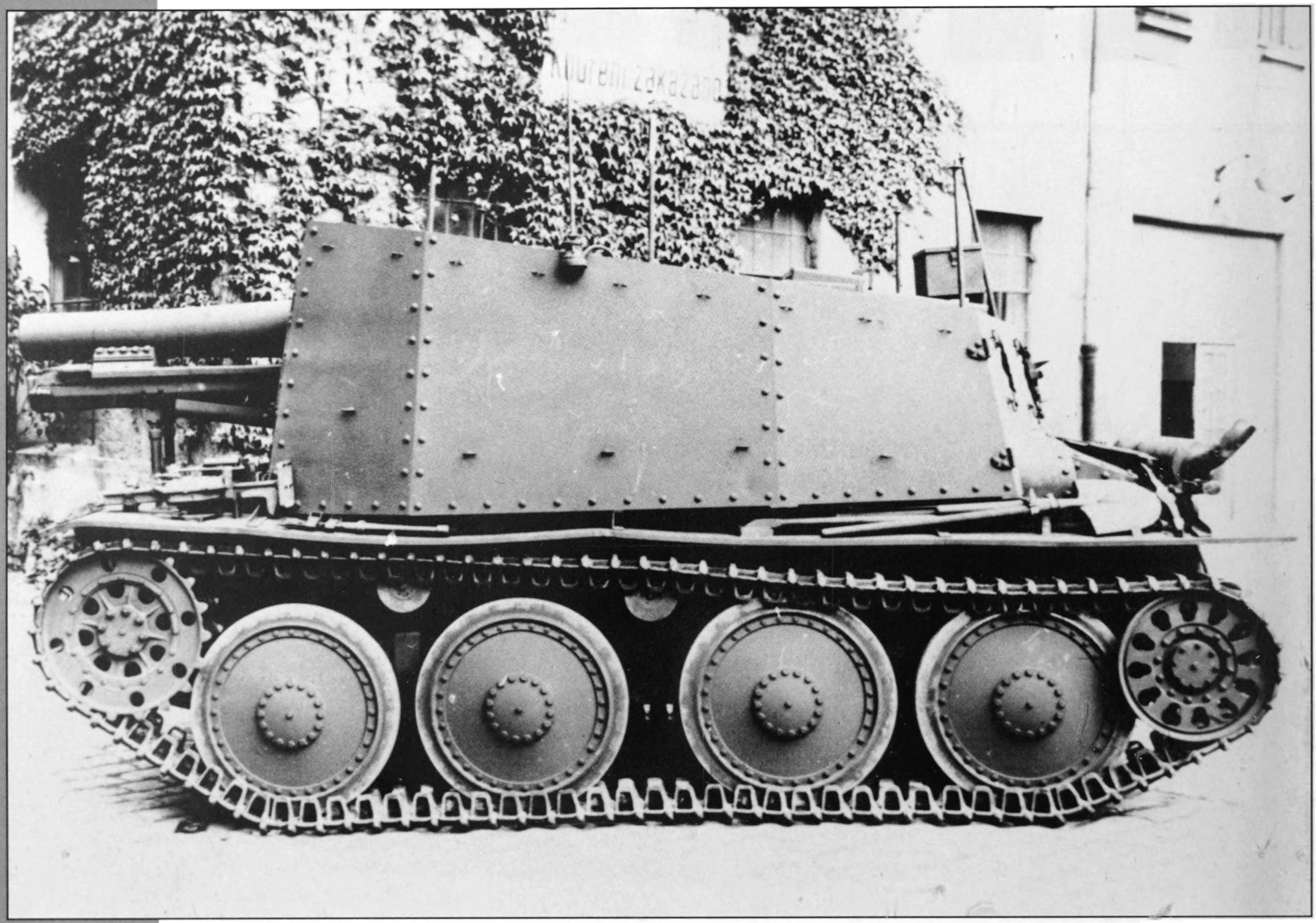

Transport box for periscope
Periscope mount
2 rounds 15cm
2m rod antenna
Rain cover
Fu 5 radio set below 2 converters
Commander's seat, foldable
Gun's spare part box
Ammo for signal pistol, pistol below
Fire extinguisher
Box for 6 ready to fire rounds
15cm sIG 33/1
First aid box
Gun cleaning rod
2x6 boxes for charges
Driver's control box
Four rounds 15cm rounds under rain covers
Seat cushion for loader
Foldable rain cover for ammo box
Charge/ grenade preparation area
4 spare track links

The modified interior of the production model. Note that the Fu 5 radio set now is situated at the left hand side within the reach of the commander. Six ready rounds were stored in the box arrangement to the right of the commander's seat. Although the inside was also cramped, work was not too difficult for the crew. The perforated plate was used for packing cartridges and setting of fuses. (Photo Netik)


Gun's spare parts box
Box for 6 ready to fire rounds
Foldable rain cover for ammo box
2m rod antenna
Periscope mount


Gun's spare parts box
Box for 6 ready to fire rounds
Foldable rain cover for ammo box
Fu 5 radio set below 2 converters
2m rod antenna
Periscope mount
Ballistical data board
Periscope transport box
1 gas mask
15cm sIG 33/1

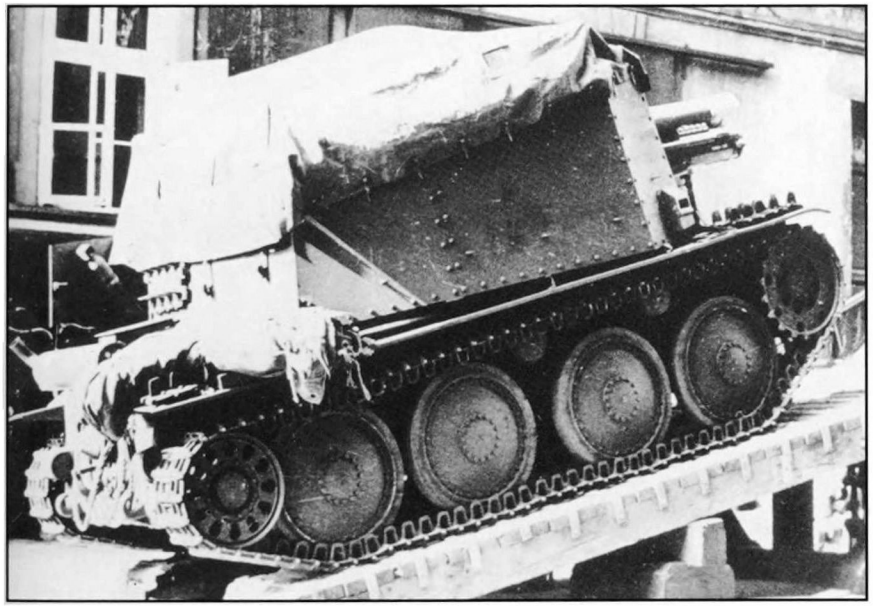
A nice view of the left hand side. Note the ballistic data board fitted to the side wall to the right of the gunners seat cushion. The rack for the Fu 5 radio sets is empty. The ammo storage box on the engine cover is evident. The front box could be flapped upwards giving way to the fuses. The loader could easily handle the rounds, which were always kept dry. (Photo Netik)



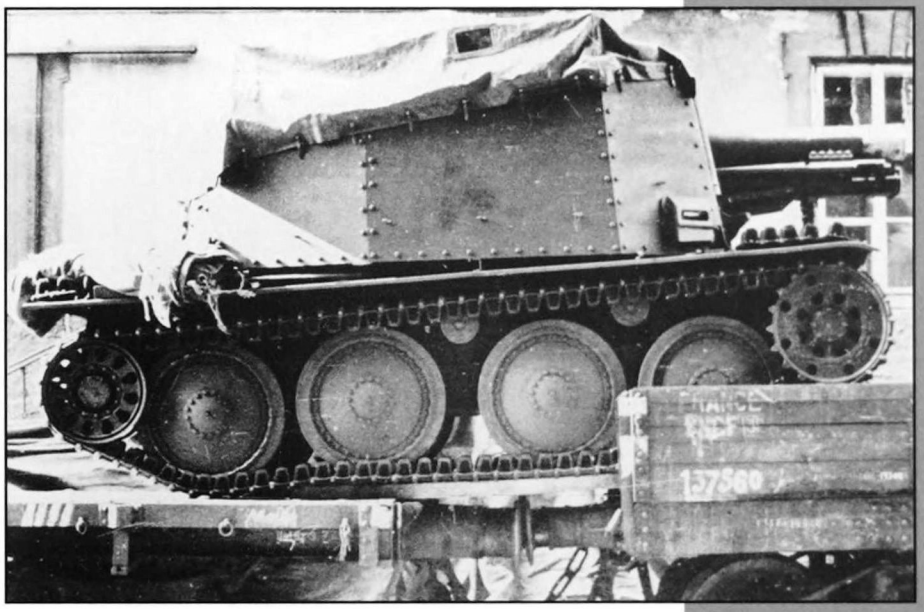
The Grille from the side. Note the variety of tools mounted to the already damaged track cover. Lots of loops are spread over the superstructure walls, these were used to apply foliage. The Grille was small enough to conceal behind bushes or smaller trees, or any sort of natural camouflage that was added. (Photo Netik)

Footman loops near the top of the armored sides were used to secure a canvas cover as seen here. This was only installed while in secure areas, as it, and is rarely seen in photographs. Similar loops lower on the side were used to secure camouflage. (Stefan De Meyer)

The Panzerkampfwagen 38 (t), upon which the Grille was based, had a ball-mounted machine gun on the left front of the hull. However, no such weapon was provided on the Grille as it was not intended to operate at the front. Hence, no visors are present on this side of the vehicle. (Patton Museum, Fort Knox, KY)



Left: a Grille driving on a railway flatcar. The ramp seems to be custom made, but is apparently massive enough to carry these light-weight SP guns. The vehicle is still finished in plain gray. Note the rain cover, which is similar to that fitted to 7.62 mm armed Marder IIIs. Some window sections allowed limited sight for the crew. The open rear door shows a fire extinguisher. (Photo Netik)



Above: this SP gun is driving slowly from flatcar to flatcar to reach its final position. The Pzkw 38 (t) was an easy vehicle to handle, as the Czech-made drive gear was one of Praga-Wilson's finest developments. The flatcar is of French origin, SNCF. The large tarpaulin on the rear fender is not part of the Grilles equipment. Possibly it was used to further cover it during railway transport. (Photo Netik)

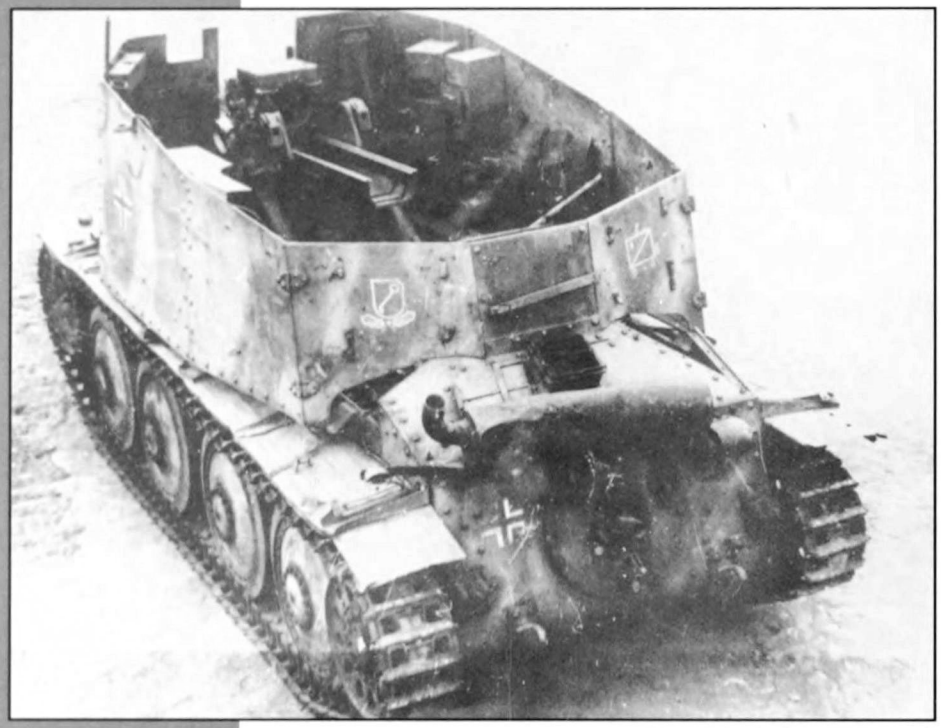
situations. The sIG 33/1 Grille was provided with a Fu 5 radio set, consisting of one transmitter and one receiver, plus converters. In production vehicles, this arrangement was mounted within the commanders reach, at the left side of the fighting compartment.

The vehicle received the designation 15cm sIG 33/1 "Grille" for cricket (not "Bison," as often quoted). Other designations were "Sfl 38" or "sIG 33 (Sfl 38)"

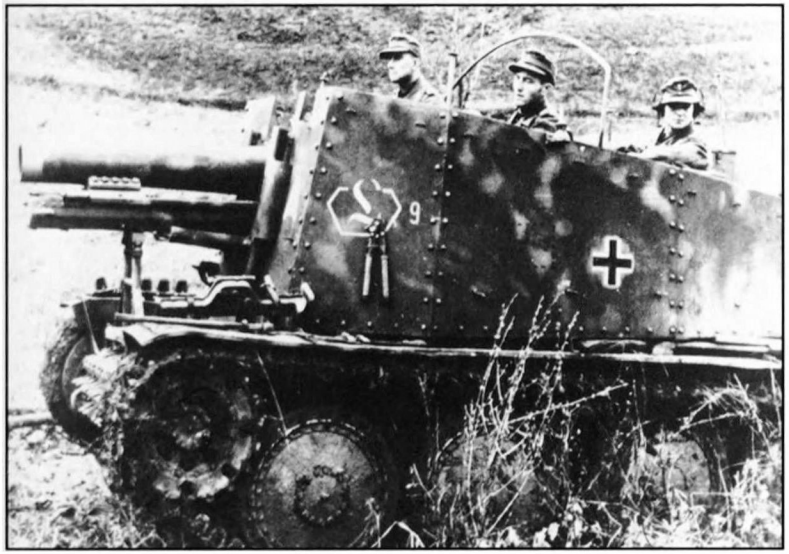
Resuming, it can be stated that the sIG 33 (Sfl 38) Grille Ausf. H was exactly the vehicle the support units demanded. It was light and agile with an excellent mobility even in rough terrain. The chassis of the Pzkw 38 (t) was battle proven and had a very high reliability. Tracks and running wheel had a long service life.

This concept proved to be successful, therefore the next production lot based on the Geschützwagen 38 (t), was an improved and specialized artillery SP gun using basically the same technology. This vehicle was intended to carry the sIG 33 (Grille Ausf. K), the 7,5 cm Pak 40 (Marder III Ausf. M) or the 2 cm Flak 38 (Flakpanzer 38). Later in 1944, the sIG 33 was mounted on the chassis of the Hetzer tank hunter. Still using the drive train and running gear of the old Pzkw 38 (t), this solution was produced in limited numbers until the end of the war showing the guiding design of the ex-Czech chassis. It is interesting that the manual warned "that the Grille should never be used in the role of an assault gun."

Used in the east, this Grille of Leibstandarte was captured almost intact by the Soviets. The colors are difficult to identify. It was camouflaged with dark green stripes over dark yellow base. It is however possible that the dark areas were Panzergrau, with dark yellow mottling applied over it. Note the white tactical marking, denoting the unit as the 6th Co. of a recce btn. The antenna mount is empty. (Photo Netrebenko)



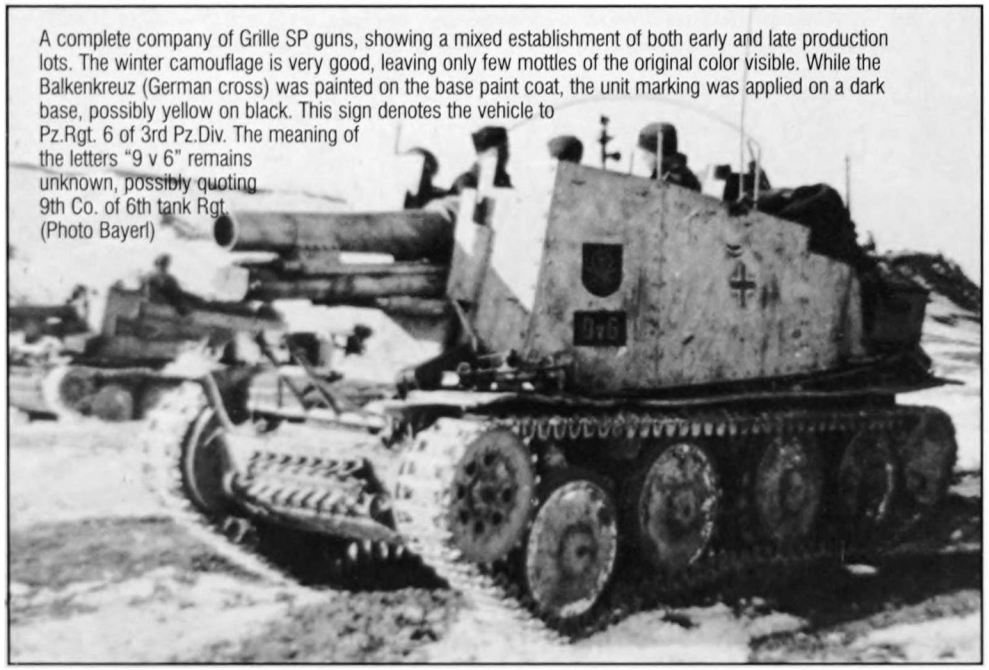
Above left: the rear view unveils more details. Next to the tactical marking the key symbol of "LAH" is visible. The exhaust air outlet upon the engine cover shows a small dome, which can be closed with a shutter. This was possibly done in winter to accelerate warming-up of the engine. (Photo Netrebenko) **Above right:** Grille during a pause. The crew's attempt to conceal the vehicle is quite acceptable. Note that the canvas support is mounted. (Photo Buchner) **Right:** a side view of the LAH vehicle. Note that snow clasps are fitted to the tracks in certain distances. This simple, but effective device was also available for the Hetzer tank hunter. (Photo Netrebenko)



Above: a Grille of 9./Pz.Gren.L.Rgt. 901 (9th co., Panzergrenadier-Lehrregiment 901), assigned to Panzerlehr-Division, photographed during anti-partisan duties in Bosnia, late autumn 1943. The vehicle shows heavy mottling of dark green and dark brown over the dark yellow base color. The unit marking is evident, behind this a black weight classification label is barely visible. (Photo Bayerl) **Below:** two Grille in position near the Italian town of Carroceto, Aprilia. Two destroyed Shermans litter the town center. In the background a Sd.Kfz. 251/1 is visible, possibly the forward observer of this platoon. Also difficult to detect, the SP guns are camouflaged with dark brown stripes over the dark yellow base. Judged by the ammo packages packed in front of the guns, action has already lasted for a while. Two sorts of packages are visible, wooden racks and wickerwork tubes.

Waiting for the things to come. This Grille of an unidentified unit stands in the shadow of its bigger brother, the Tiger MBT. Still, these highly successful support weapons were important for all German combat in the east. The vehicle shows a worn-off winter coating applied over the dark yellow base. A muzzle cover is fitted. (Photo Bayerl)

A complete company of Grille SP guns, showing a mixed establishment of both early and late production lots. The winter camouflage is very good, leaving only few mottles of the original color visible. While the Balkenkreuz (German cross) was painted on the base paint coat, the unit marking was applied on a dark base, possibly yellow on black. This sign denotes the vehicle to Pz.Rgt. 6 of 3rd Pz.Div. The meaning of the letters "9 v 6" remains unknown, possibly quoting 9th Co. of 6th tank Rgt. (Photo Bayerl)



A Grille of an unidentified unit negotiates a corner in an Italian town in 1943. (BA)

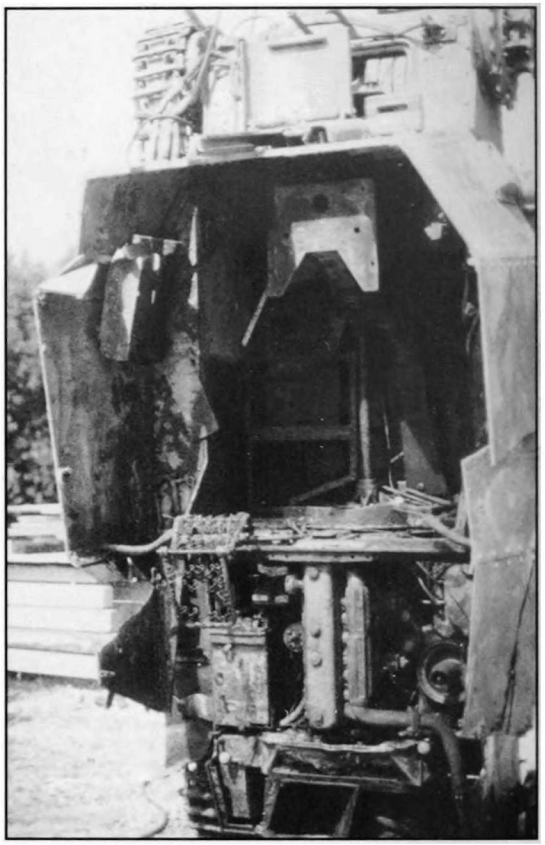
The recovery of 2115

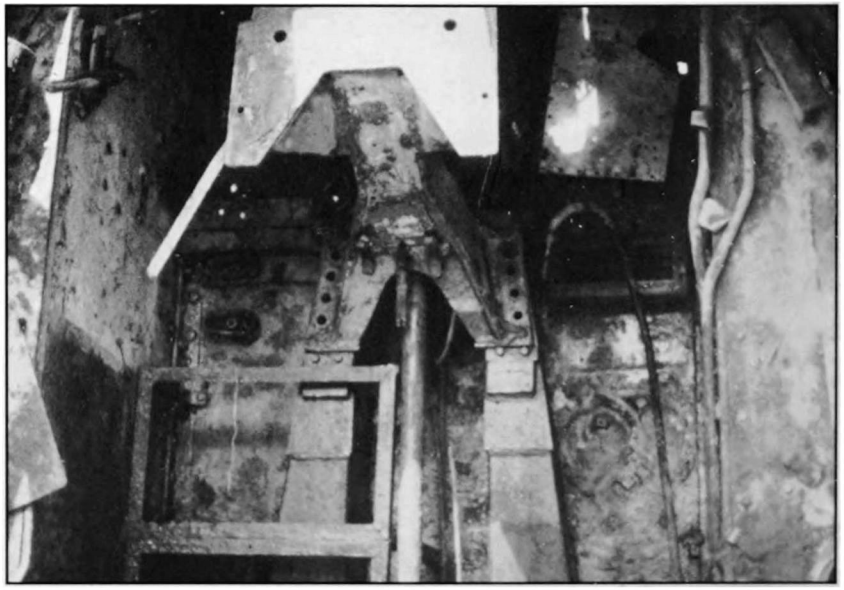
Yes, it was true! Hour after hour, divers had stirred up the mud in the river Enns until finally the gadget was found. Iron, actually scrap. But not for Mr. Josef Loidl, the manager of the Automobile Museum in the town of Lauffen, Austria. A dream came true for him—a German WW II vintage tank, and a unique vehicle at that, would be a true attraction for his collection. Now that the veteran was found, recovery could start.

The search for this relic of the last war had dragged out for years. Hints from the local residents proved that a tank had been thrown into the river around March/April 1945, possibly to dispose of this war stuff the simple way. Some recall the events of this time with ease. Unfortunately, finding the exact location after 50 years became a consuming venture. Now all worries were put aside. The divers were able to identify this discovery immediately: a self-propelled gun, armed with the 15 cm sIG 33/1, nicknamed Grille (for cricket). Even better, the first production type with a rear mounted engine. This was a true sensation!

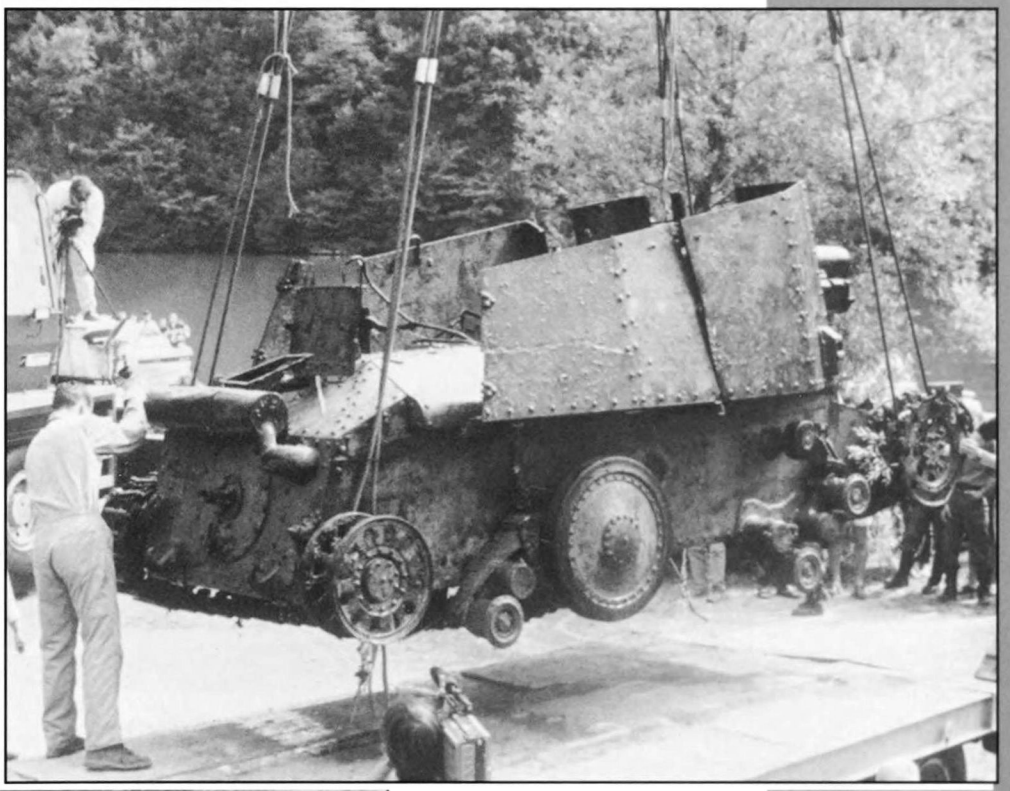
The proprietary rights would be solved months before the tank was found. Mr. Loidl managed to get the tank after one year of paper war. All other museums and private persons were rejected, among these some German institutions.

In mid 1998 recovery was set to start—this sounded pretty simple. The river Enns, one of the largest mountain streams in Austria, proved to be a true challenge for Loidl's team. As each day progressed, more problems emerged. First, a 40-ton pontoon





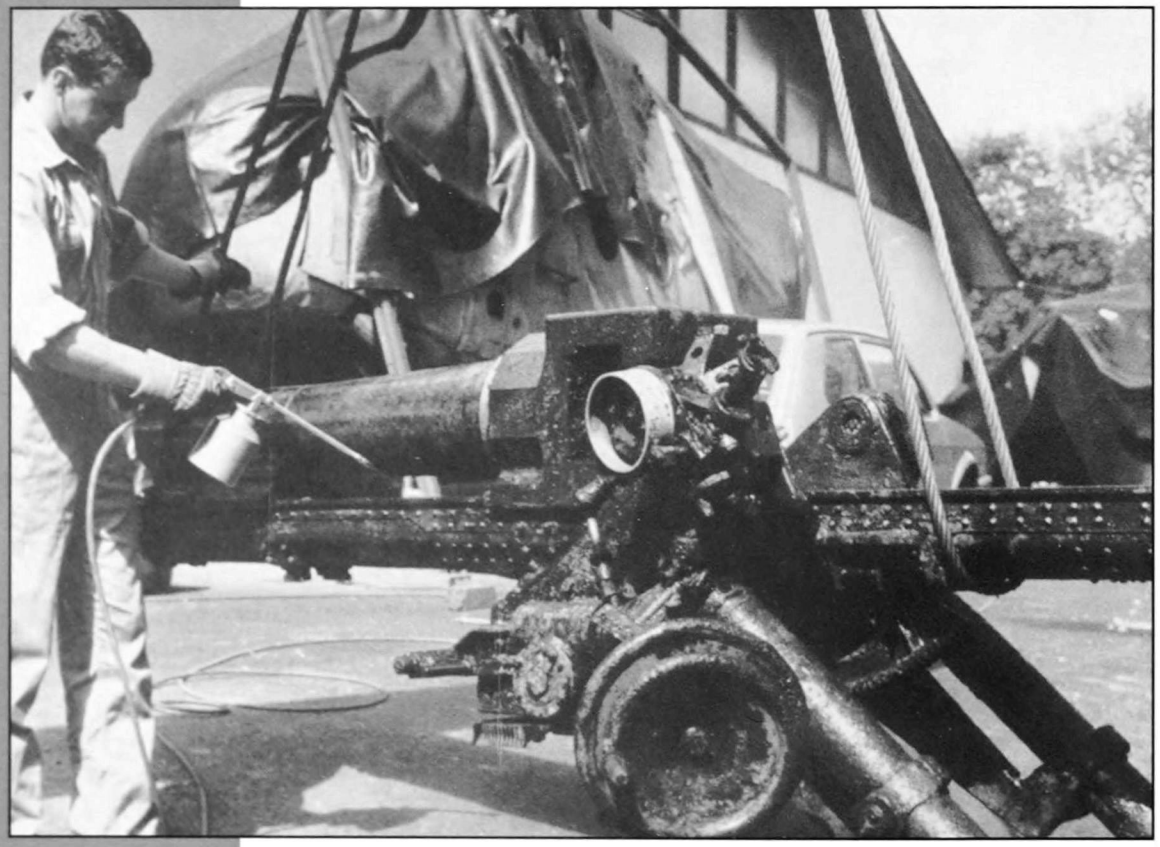
Above left: delivered to the museum yard, clean up of the Grille started immediately. The crane held the tank in a somewhat unusual position, while an employee works with the high pressure cleaner. (Photo Loidl) **Above right:** a view into the vehicle. The gun is already removed, leaving the trestle visible. The engine is still in place. (Photo Loidl) **Right:** a closer view to the gun mount. The trestle is of welded construction. Below this, a V-shaped reinforcement is visible, a rather crude construction. (Photo Loidl)



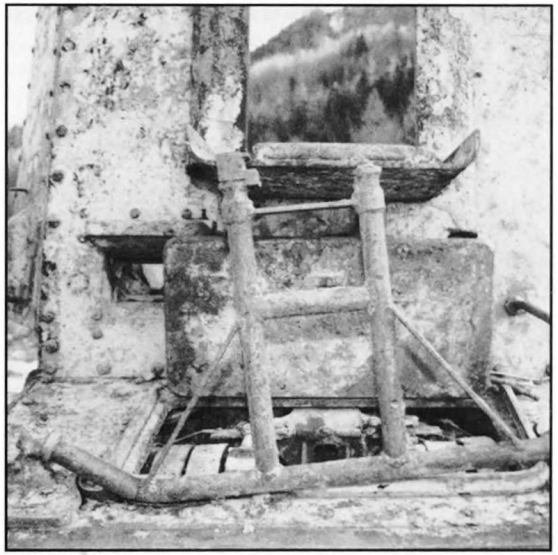
Above left: hundreds of spectators are viewing the Grille slowly emerging from the bottom of the river Enns. Several failed attempts to recover the SP gun inflicted further damage. (Photo Loidl)

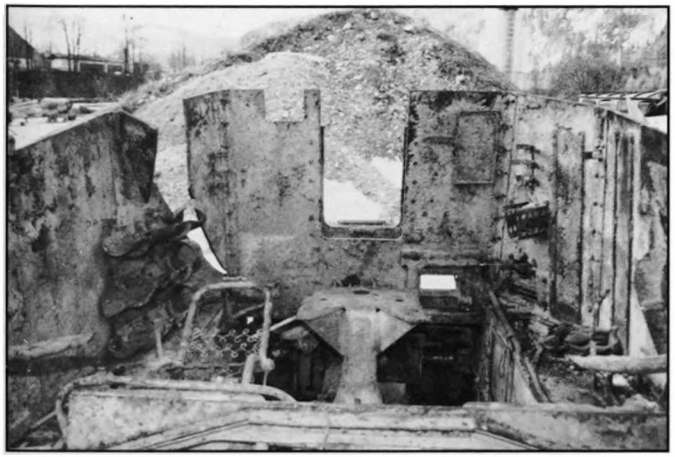
Above right: the flatbed trailer is waiting. Note that many parts of the running gear were left in the water, further search was necessary. Still some running wheels and a number of track links are missing. (Photo Loidl)

Left: the overall good state of the vehicle is amazing. (Photo Loidl)



Above left: the gun receives a wash with a rust-converter, partly to loosen 40 years of rust, partly to conserve the parts until further restoring takes place. (Photo Loidl) **Above right:** the Grille from the right hand side. The drive sprocket is damaged and the complete front running wheel assembly is missing. The chassis of the Pzkw 38 (t) was used almost unchanged. **Right center:** the left part of the superstructure shows a broken plate, probably damaged when the tank was sunk in the river. The drive sprocket is missing some teeth. **Below right:** the armor plate at the extreme right is broken as well. When hitting the ground, the rear running wheel assembly was also destroyed. **Left:** this photo shows the engine compartment. The engine and engine cover plate were already removed.





Above left: this view shows the degree of damage inflicted to the running gear.

Above center: the gun travel rest is slightly damaged. The large lid allowed access to the transmission.

Above right: another view of the travel rest. The transmission cover flap is closed. Note the vertically shifting armor plate in the background. When the gun is elevated, this plate would follow the movement always covering the gap between superstructure and gun cradle.

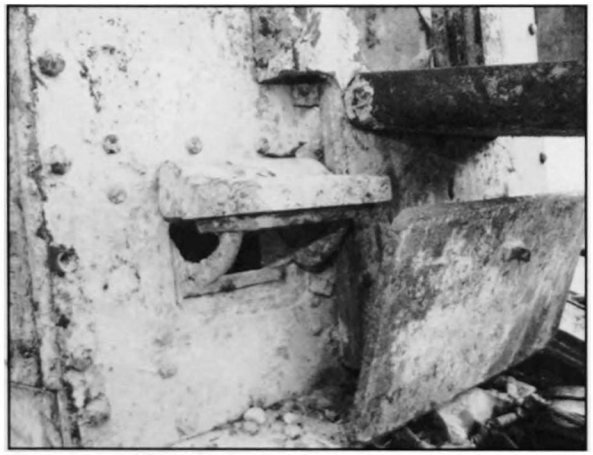
Left: a good view into the fighting compartment. There was enough space for the 4-man crew, only the driver lived on the uncomfortable side.

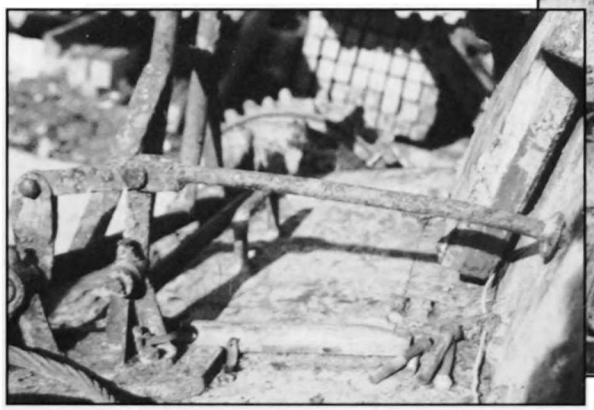
Below left: the drivers' visor was a standard Pzkw 38 (t) part and can be seen on a variety of vehicles.

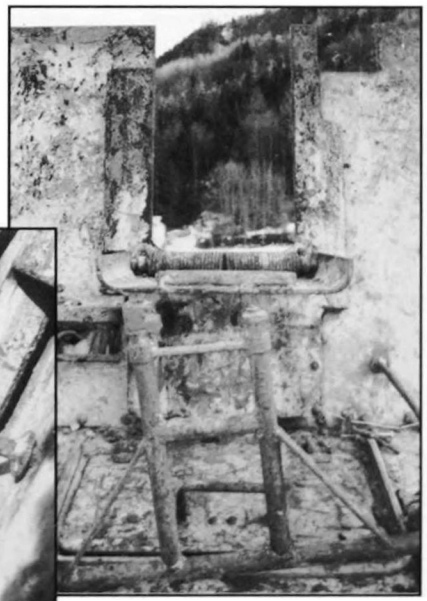
Below center: a close up to the gun travel rest crank.

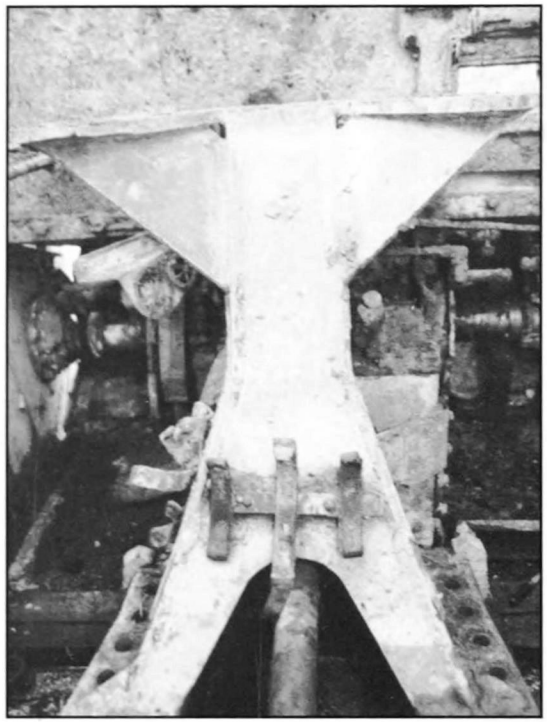
Below: this view shows the large spring of the gun's protection plate. The complete superstructure was bolted, a construction characteristic of the many ex-Czech vehicles used by Germany.

Below right: here the complete gun cradle protection is visible. When elevating the gun, the now horizontal plate would follow this movement.





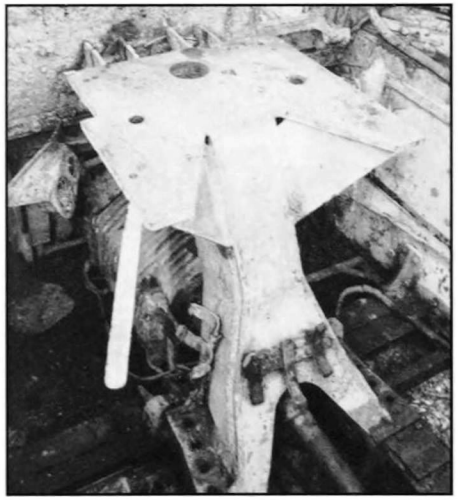




Above left and center: the trestle carried the sIG 33/1. This massive carrier was of welded construction. It was fixed to the bottom with eight massive bolts. Additionally, the trestle was fixed to the frontal plate as well. Brackets for two gas masks are visible.The gun mount trestle had to be open to the bottom to give way for the drive shaft. Two metal beams reinforced the trestle itself.

Above right: the release lever for the gun mount crank. The lever could be fixed in two positions.

(a floating bridge) had to be constructed and a large excavator was installed on it. After two long days of underwater activity, a giant crater was dug out 12 meters in depth, which contained the tank. With shovels and hands, work continued underwater until identification was possible. Delighted with the result of the

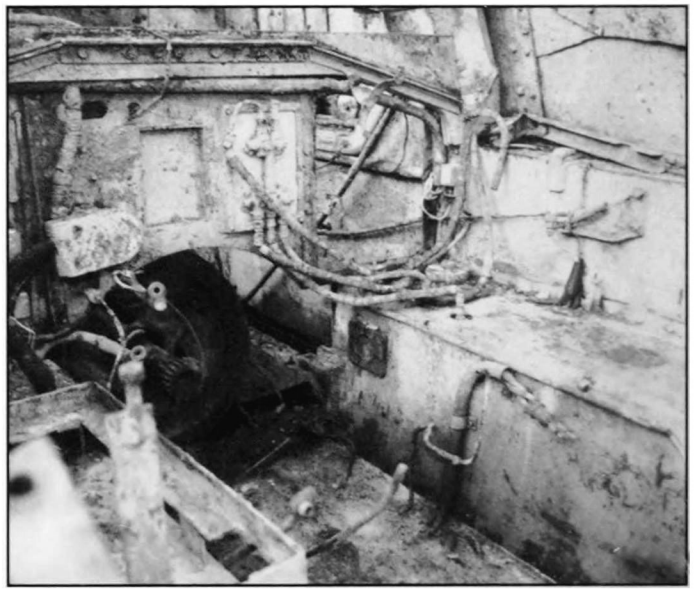


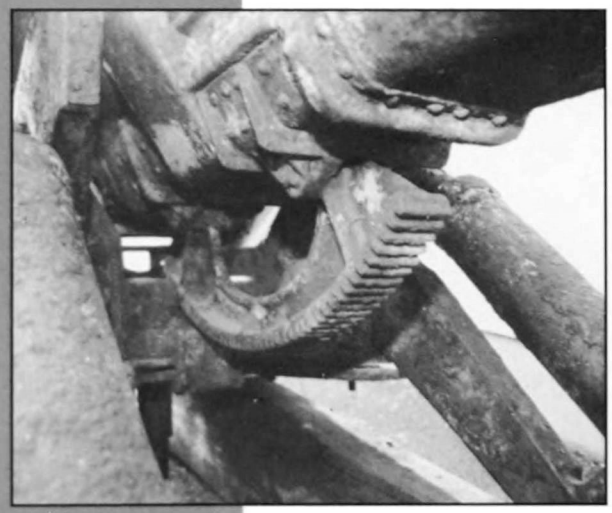
Right: a view of the fuel tank and the firewall.

Below left: the large sprocket of the elevation mechanism.

Below: the cradle houses the recuperator.

Below right: the 15 cm sIG 33/1 is stored. Again the relatively good state of the guns is astonishing.





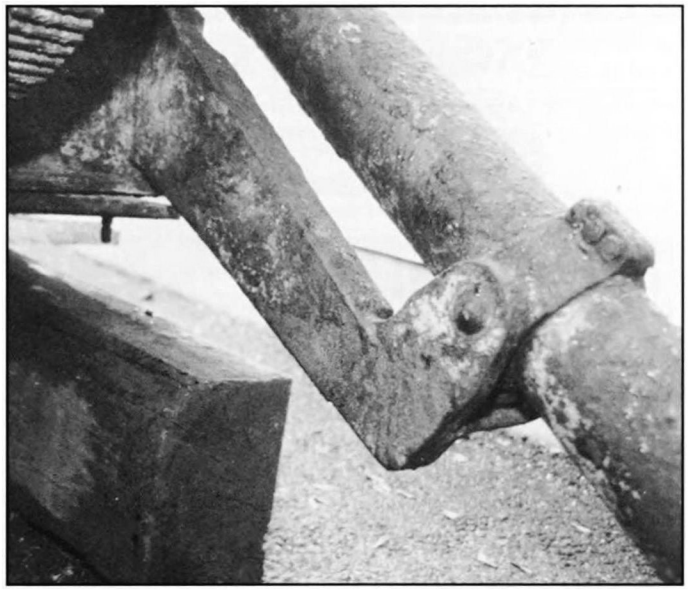
search, Loidl's crew started recovery. By this time, the weather changed, a thunderstorm approached. Due to this storm, the pontoon had to be shipped to a calm bay. The spell of bad weather, accompanied by high water, made further progress impossible. The team was forced to cease recovery for several months. In autumn 1998, better weather made continuation of the recovery possible. The crater however had vanished, and the excavator needed two days to find it again.

Again, fate apparently worked against Loidl's team—the weather changed again and the crater filled with sand and mud a second time. The start of winter stopped all further efforts. Mr. Loidl, who had made a tremendous financial investment and now seemed defeated by the monstrous river Enns, considered the complete suspension of the recovery. Finally in the summer of 1999, a further attempt was undertaken and now Loidl succeeded.

When the Grille was found again, four steel ropes were attached at its edges and the tank was slowly lifted. With the self-propelled gun hanging under the hull, the pontoon was slowly hauled to firm ground. Only here was it possible to lift it out of the water. Now the Grille stands on the museum yard, roughly cleaned and dismounted. After 50 years under water it waits for restoration, which will hopefully be finished in 2002.

The fate of 2115

To learn more about the vehicle, it was necessary to determine the chassis no. (Fahrgestell-Nummer), which is 2115. This was subsequently passed over to a specialist in the United States, Mr. Tom Jentz and with his help the Grille's history was unveiled. According to this number, the vehicle was attached to the Pz.Gren.Div. "Großdeutschland" (GD) in April 1943. 2115 appeared a second time in the divisions' papers in September 1943, so this information is reliable. The vehicle fought with GD in the east and was possibly

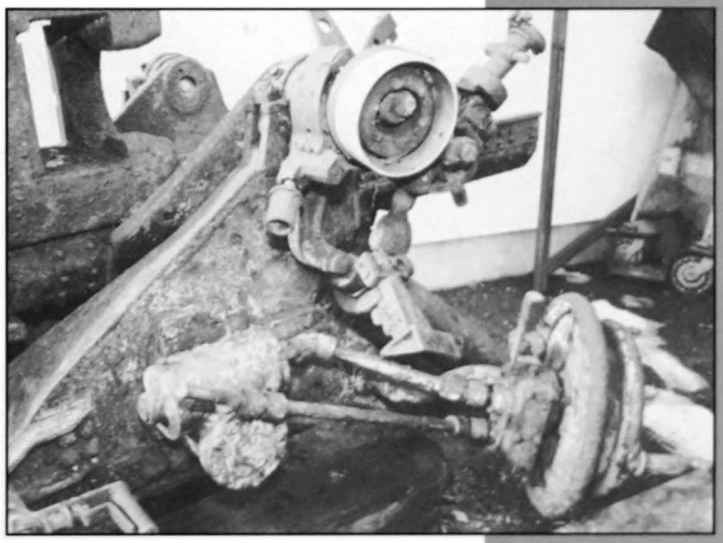


Above: the equilibrators were fixed at the side pointing to the rear.

Above right: the massive lever of the equilibrator.

Below left: the muzzle of the sIG 33/1. Note the rifling inside the barrel.

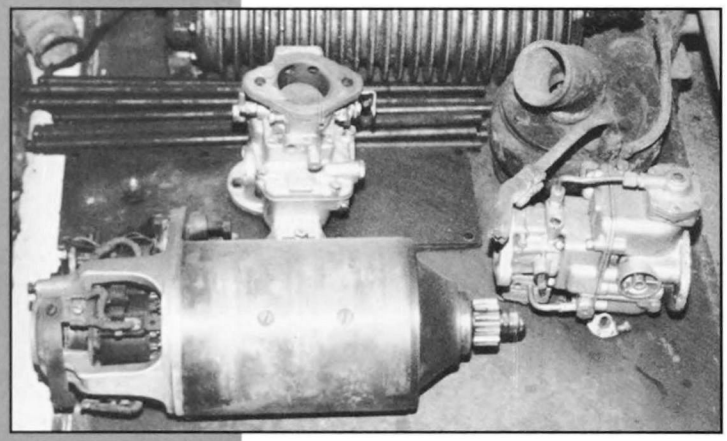
Below center and right: the side traverse and elevation gear was handled with one mechanism. Both the hand wheels were mounted on one central shaft. Above these, the gun sight mount is visible.



sent for major repair works to a depot in 1944. Towards the end of 1944, a new unit was formed from cadre and training units of GD called Führer-Grenadierbrigade (FGB). Between the years 1944/1945 FGB was renamed to Führer-Grendierdivision (FGD) for disguise reasons, a true paper tiger. FGD fought towards the end of the war around Vienna, Austria, retreating to the west. Probably our Grille was issued to FGB and found its way to the Salzburg area with the remnants of the Führer-Begleitdivision. Here it was slipped into the river Enns.

The future of 2115

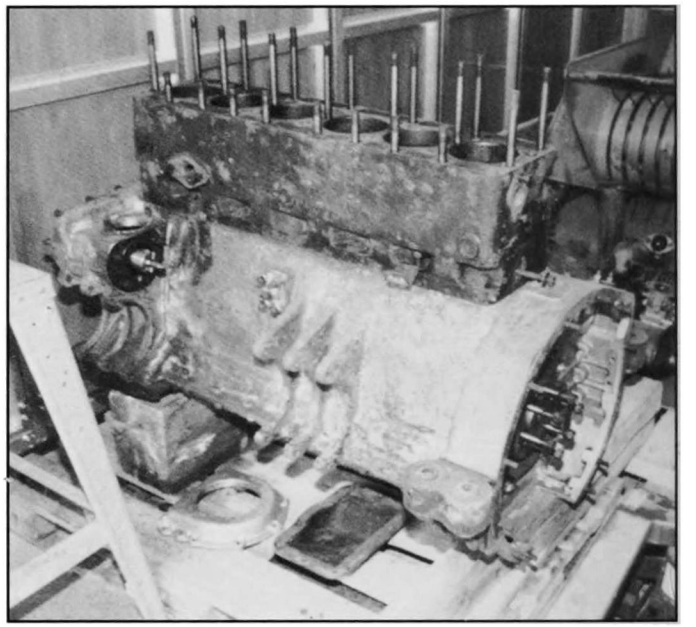
The recovered Grille was in remarkable condition. Of course, there were some parts of the running gear missing and the superstructure shows cracked side plates. Regardless of this, Mr. Loidl declared that the museum would be able to repair the vehicle to running condition.



Acknowledgements

The author wishes to thank Mr. Josef Loidl for giving access to his freshly recovered Grille. Mr. Tom Jentz also helped with valuable information. Furthermore, the gentlemen Bayerl, Buchner, Fleischer, Netik, Netrebenko and Seeler provided precious wartime photos.
Additional information was given by the following publications:

Die motorisierten Schützen und Panzergrenadiere 1935 bis 1945 by W. Fleischer.
Waffen Revue Vol. 59, 60, Germany.
Technical Manual D 2025, Author.

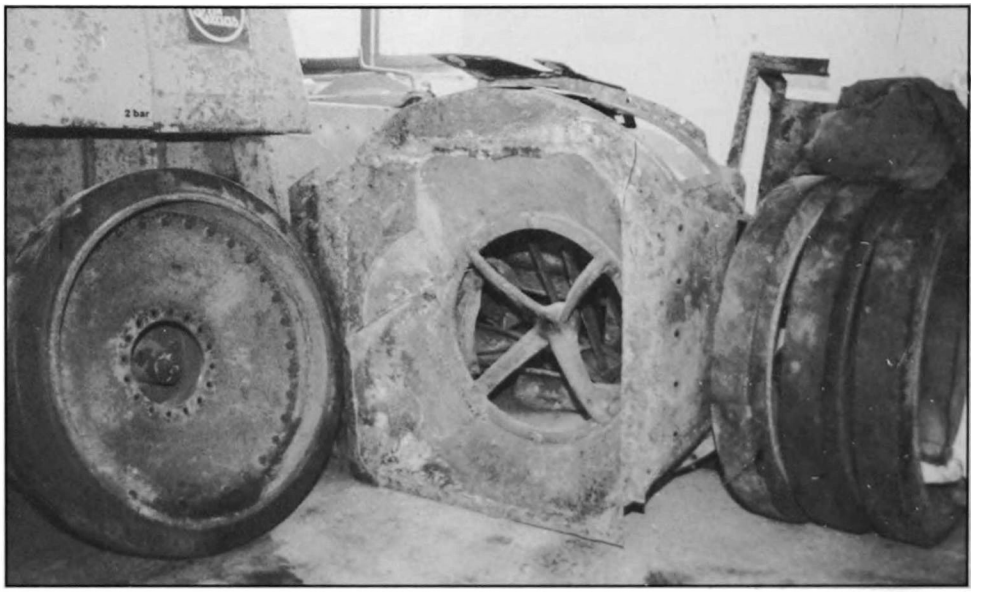


Left: parts of the engine are already cleaned. Carburetor and dynamo are already working.

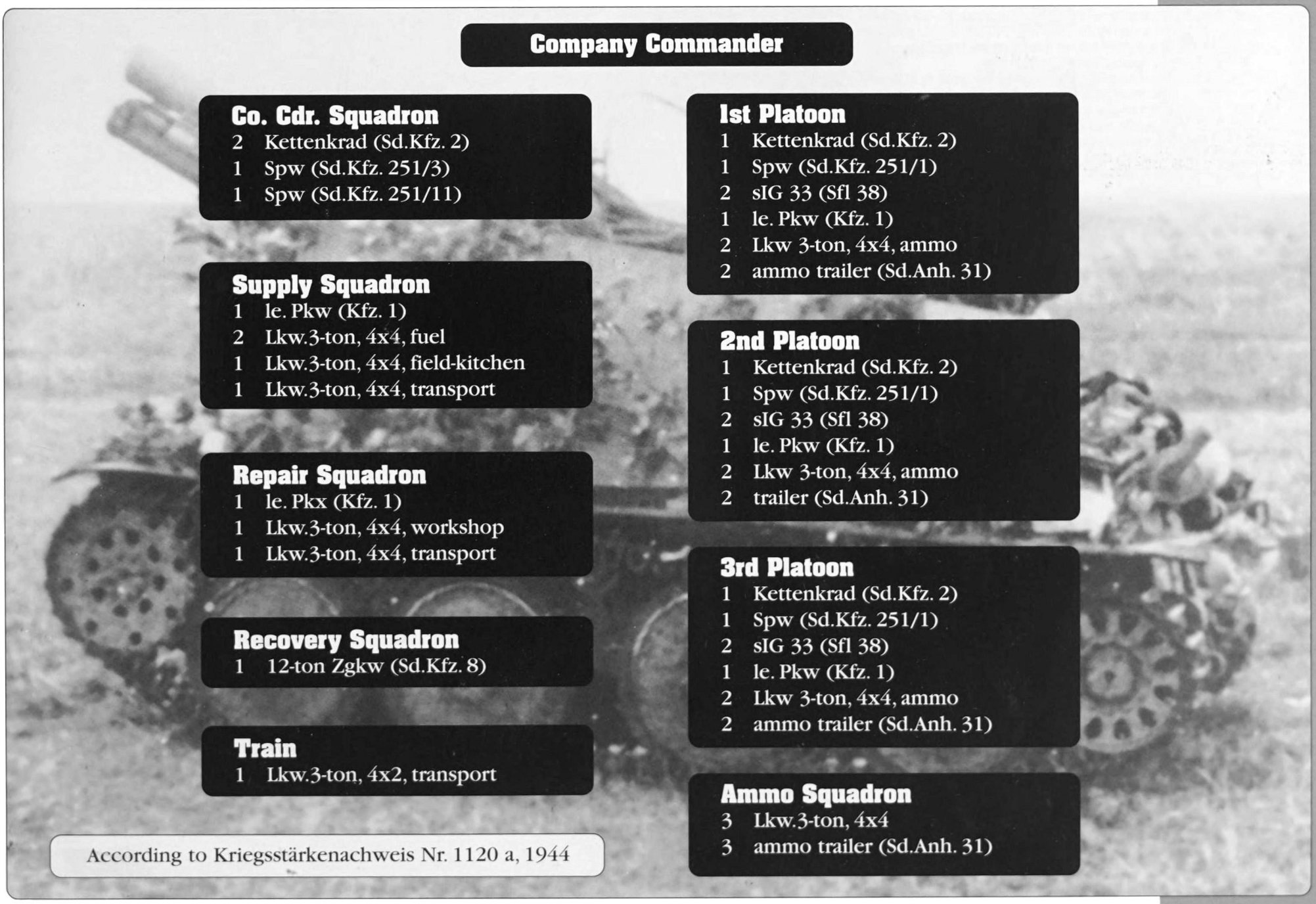
Above right: the engine block. The 7.75 liter, six-cylinder engine delivered 140 PS.

Below left: while cleaning up the Grille, a lot of parts were found in the mud. Among them were boots, steel helmets and food rations.

Below right: more parts of the Grille puzzle.



Schwere Geschützkompanie (6 sIG 33/Sfl 38)
Heavy Infantry Gun Company



Company Commander

Co. Cdr. Squadron
2 Kettenkrad (Sd.Kfz. 2)
1 Spw (Sd.Kfz. 251/3)
1 Spw (Sd.Kfz. 251/11)

Supply Squadron
1 le. Pkw (Kfz. 1)
2 Lkw.3-ton, 4x4, fuel
1 Lkw.3-ton, 4x4, field-kitchen
1 Lkw.3-ton, 4x4, transport

Repair Squadron
1 le. Pkx (Kfz. 1)
1 Lkw.3-ton, 4x4, workshop
1 Lkw.3-ton, 4x4, transport

Recovery Squadron
1 12-ton Zgkw (Sd.Kfz. 8)

Train
1 Lkw.3-ton, 4x2, transport

1st Platoon
1 Kettenkrad (Sd.Kfz. 2)
1 Spw (Sd.Kfz. 251/1)
2 sIG 33 (Sfl 38)
1 le. Pkw (Kfz. 1)
2 Lkw 3-ton, 4x4, ammo
2 ammo trailer (Sd.Anh. 31)

2nd Platoon
1 Kettenkrad (Sd.Kfz. 2)
1 Spw (Sd.Kfz. 251/1)
2 sIG 33 (Sfl 38)
1 le. Pkw (Kfz. 1)
2 Lkw 3-ton, 4x4, ammo
2 trailer (Sd.Anh. 31)

3rd Platoon
1 Kettenkrad (Sd.Kfz. 2)
1 Spw (Sd.Kfz. 251/1)
2 sIG 33 (Sfl 38)
1 le. Pkw (Kfz. 1)
2 Lkw 3-ton, 4x4, ammo
2 ammo trailer (Sd.Anh. 31)

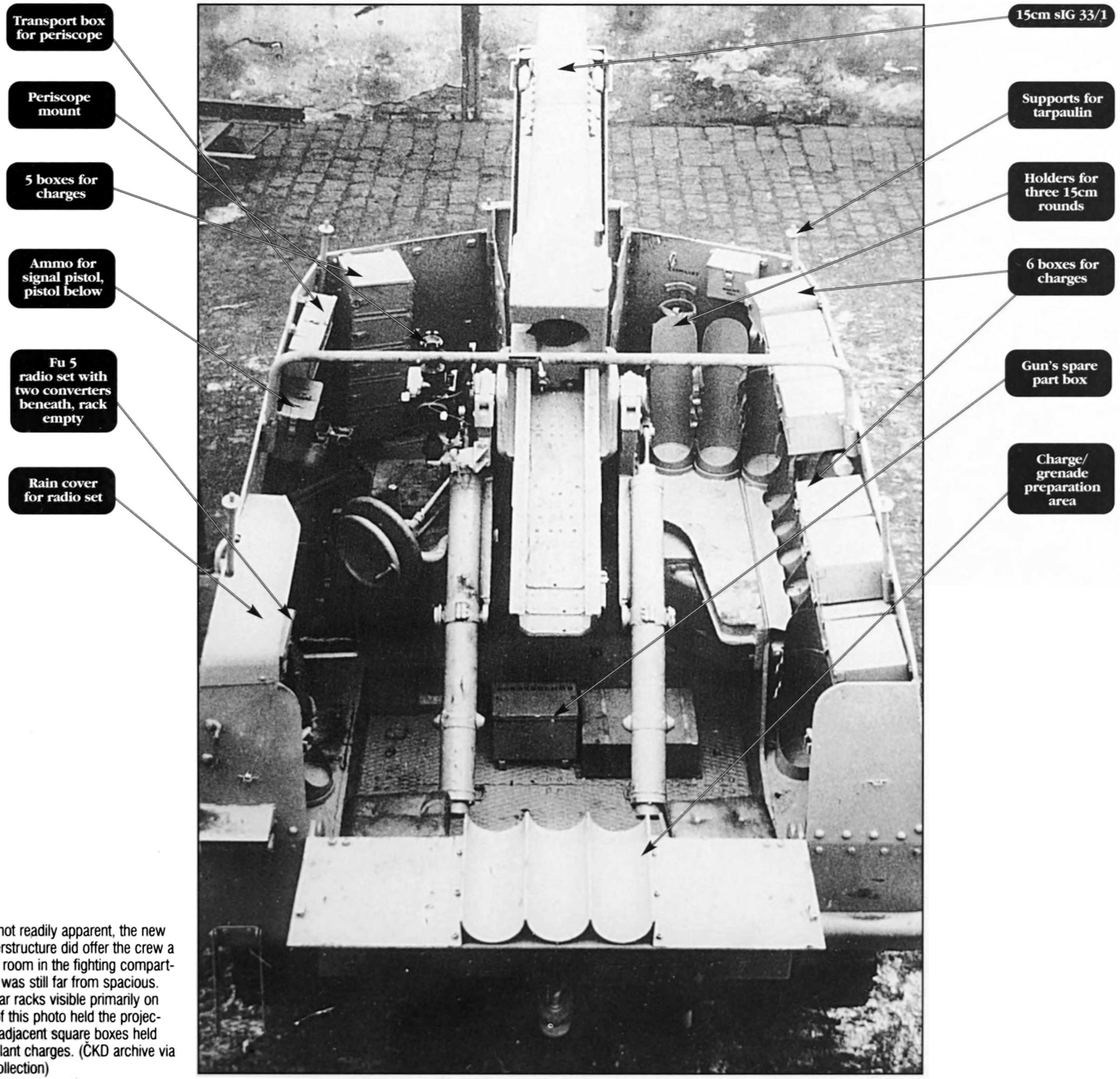
Ammo Squadron
3 Lkw.3-ton, 4x4
3 ammo trailer (Sd.Anh. 31)

According to Kriegsstärkenachweis Nr. 1120 a, 1944

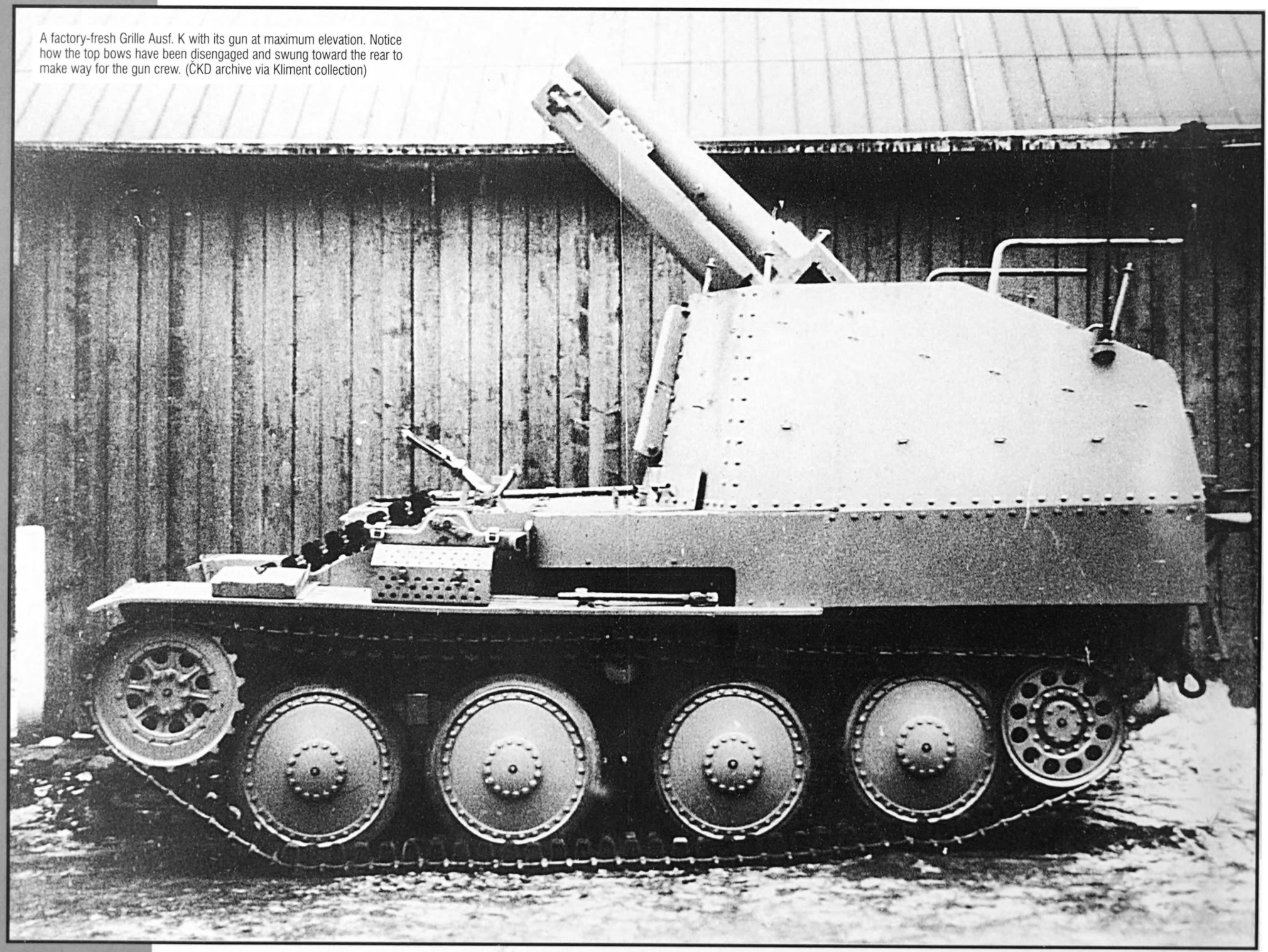
While the Geschützwagen 38 fuer s.I.G. 33/1 (Sf)(Sd.Kfz. 138/1) 'Grille' was considered a success by the Waffenamt, there was still room for improvement. The fighting compartment was cramped, the vehicle was poorly balanced and it was felt that it's barn-like sides presented to large of a target.

Therefore efforts began to mount the 10.5 cm howitzer in the mid-engine 38(t)-based chassis developed for the Panzerjäger 38 Ausf. M. The larger bore of the schwere infanteriegeschütz required that the superstructure sides and front be modified for the chassis' new role.

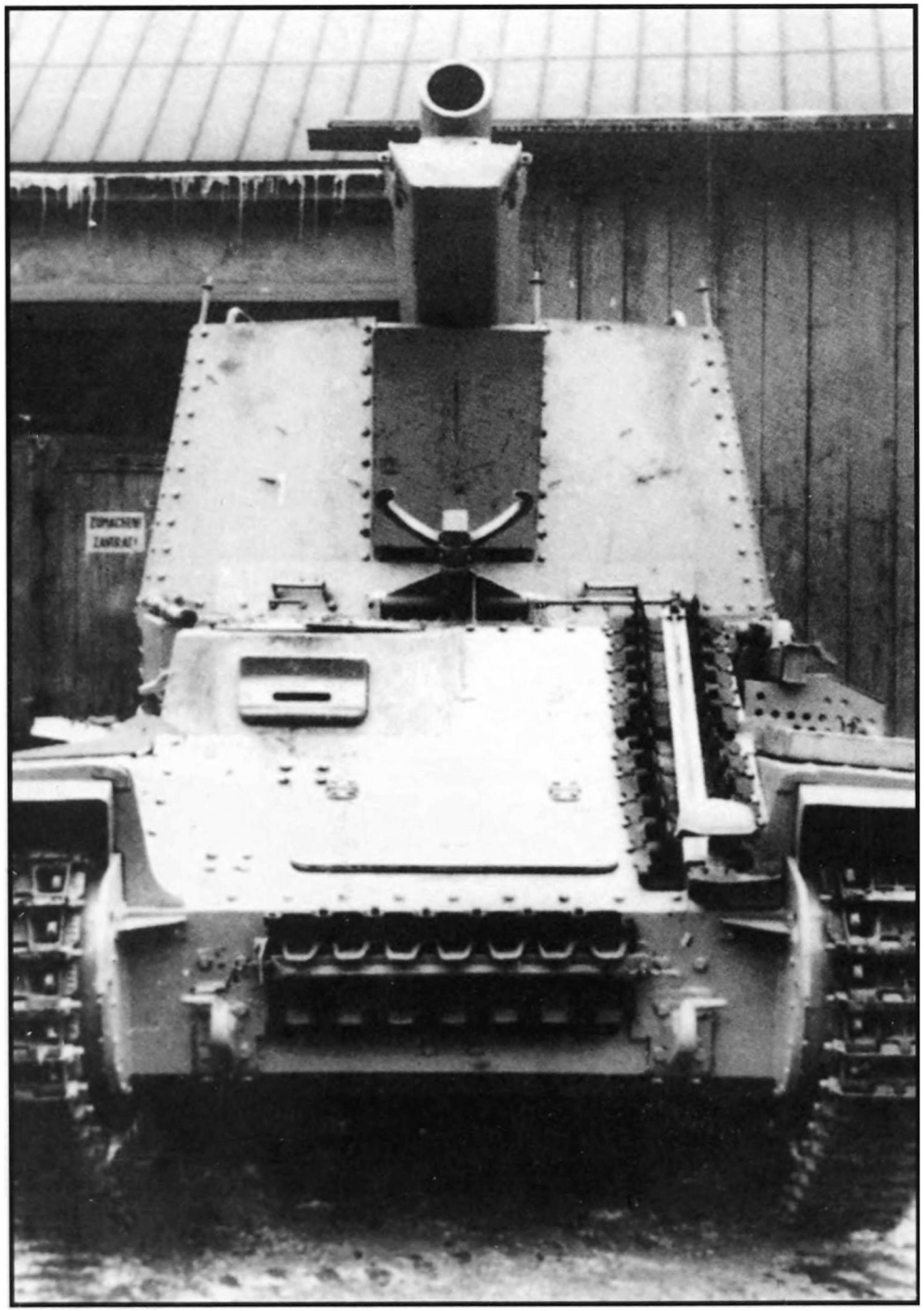
Designated the Geschützwagen 38 Ausf. K, production began by BMM in December 1943 and continued through August 1944. During this time period 152 of the contracted 200 vehicles were produced. The increased need for tank hunters caused the production emphasis to be shifted to the Jagdpanzer 38 at that time. A further 17 Geschützwagen 38 Ausf. K were produced in February and March of 1945. In the field these vehicles were used interchangeably with the earlier Geschützwagen 38 fuer s.I.G. 33/1 (Sf)(Sd.Kfz. 138/1) Grille. (ČKD archive via Kliment collection)

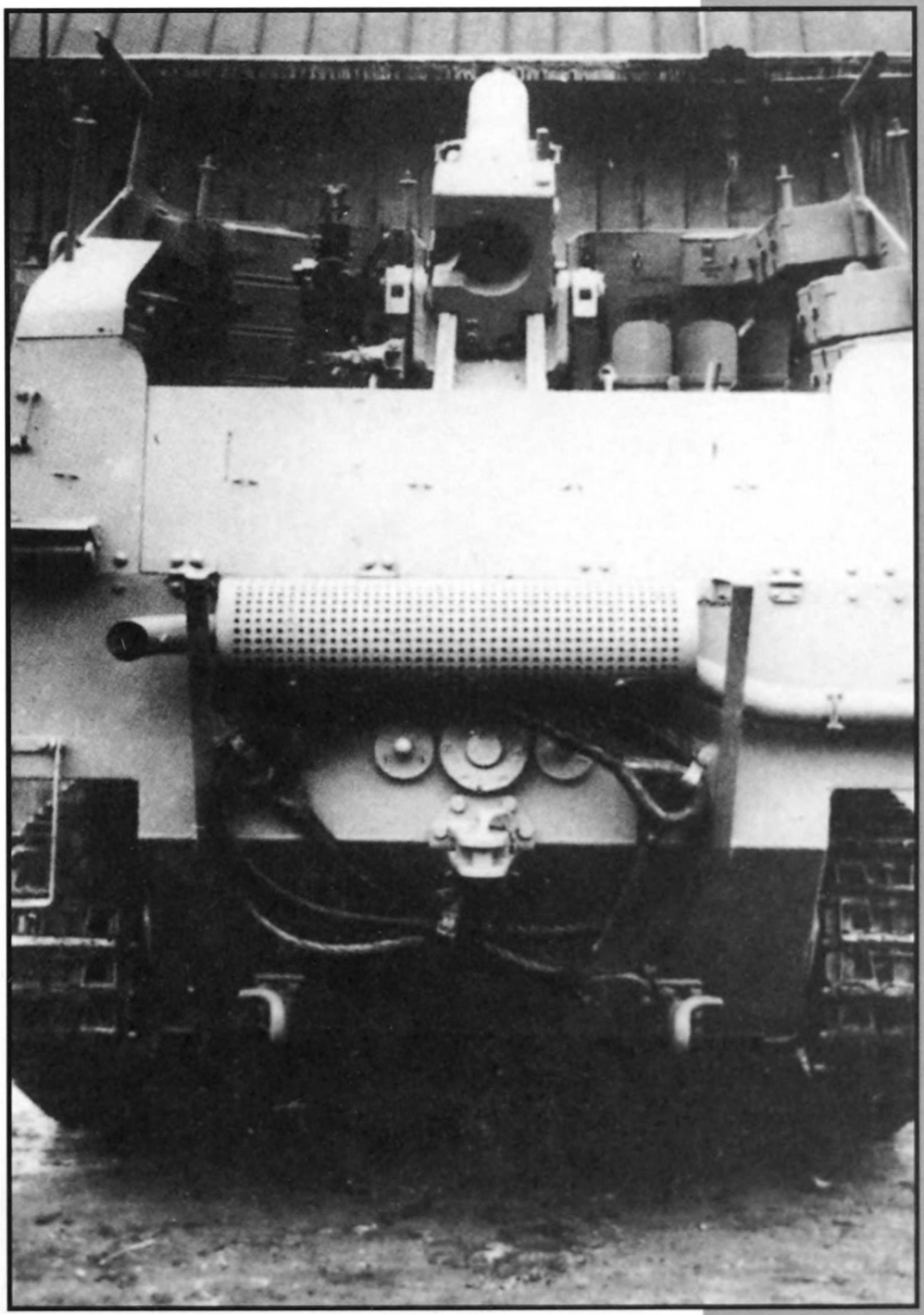

Transport box for periscope
Periscope mount
5 boxes for charges
Ammo for signal pistol, pistol below
Fu 5 radio set with two converters beneath, rack empty
Rain cover for radio set
15cm sIG 33/1
Supports for tarpaulin
Holders for three 15cm rounds
6 boxes for charges
Gun's spare part box
Charge/ grenade preparation area

Although not readily apparent, the new style superstructure did offer the crew a little more room in the fighting compartment, but was still far from spacious. The circular racks visible primarily on the right of this photo held the projectiles. The adjacent square boxes held the propellant charges. (ČKD archive via Kliment collection)

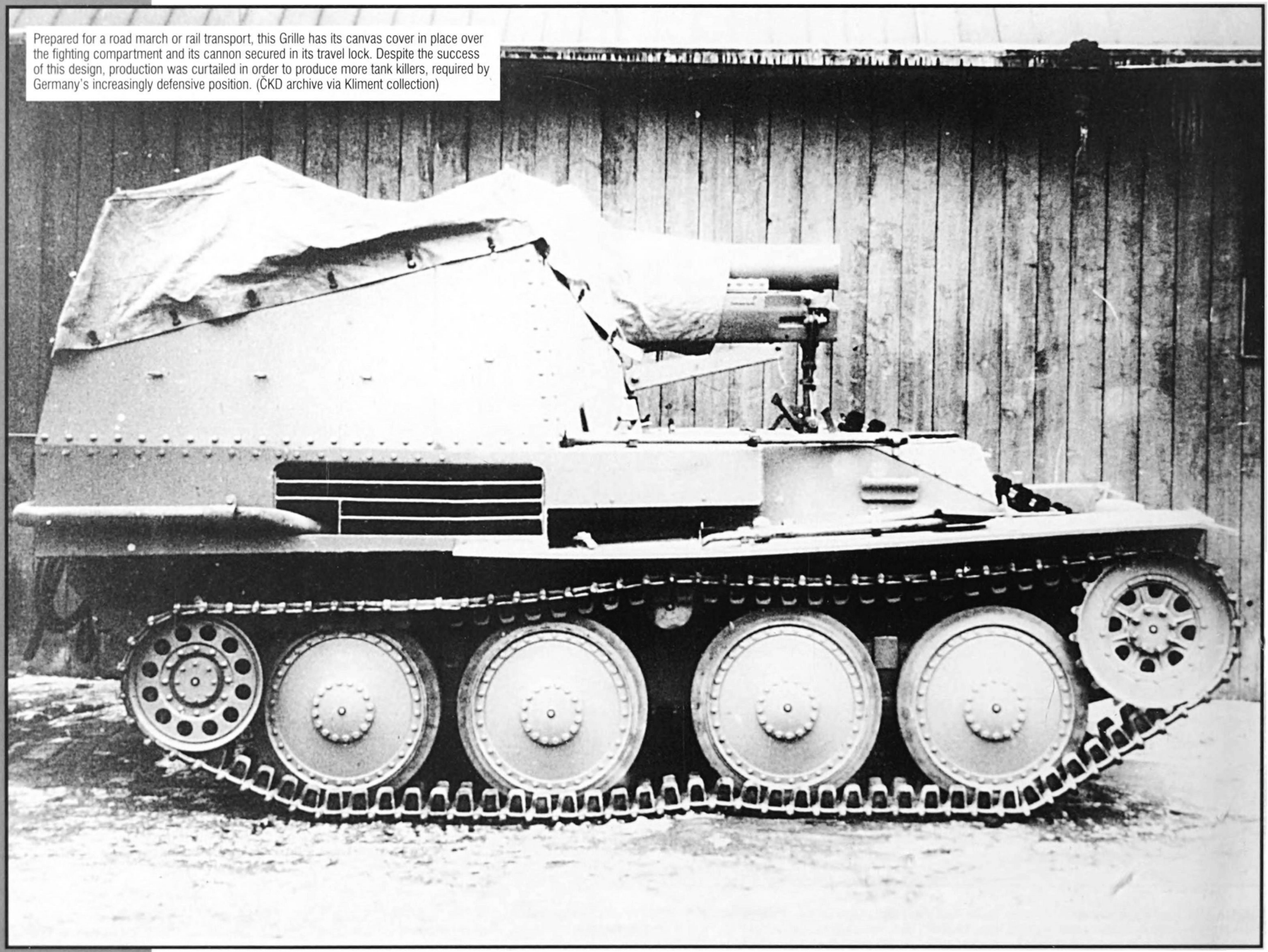


A factory-fresh Grille Ausf. K with its gun at maximum elevation. Notice how the top bows have been disengaged and swung toward the rear to make way for the gun crew. (ČKD archive via Kliment collection)

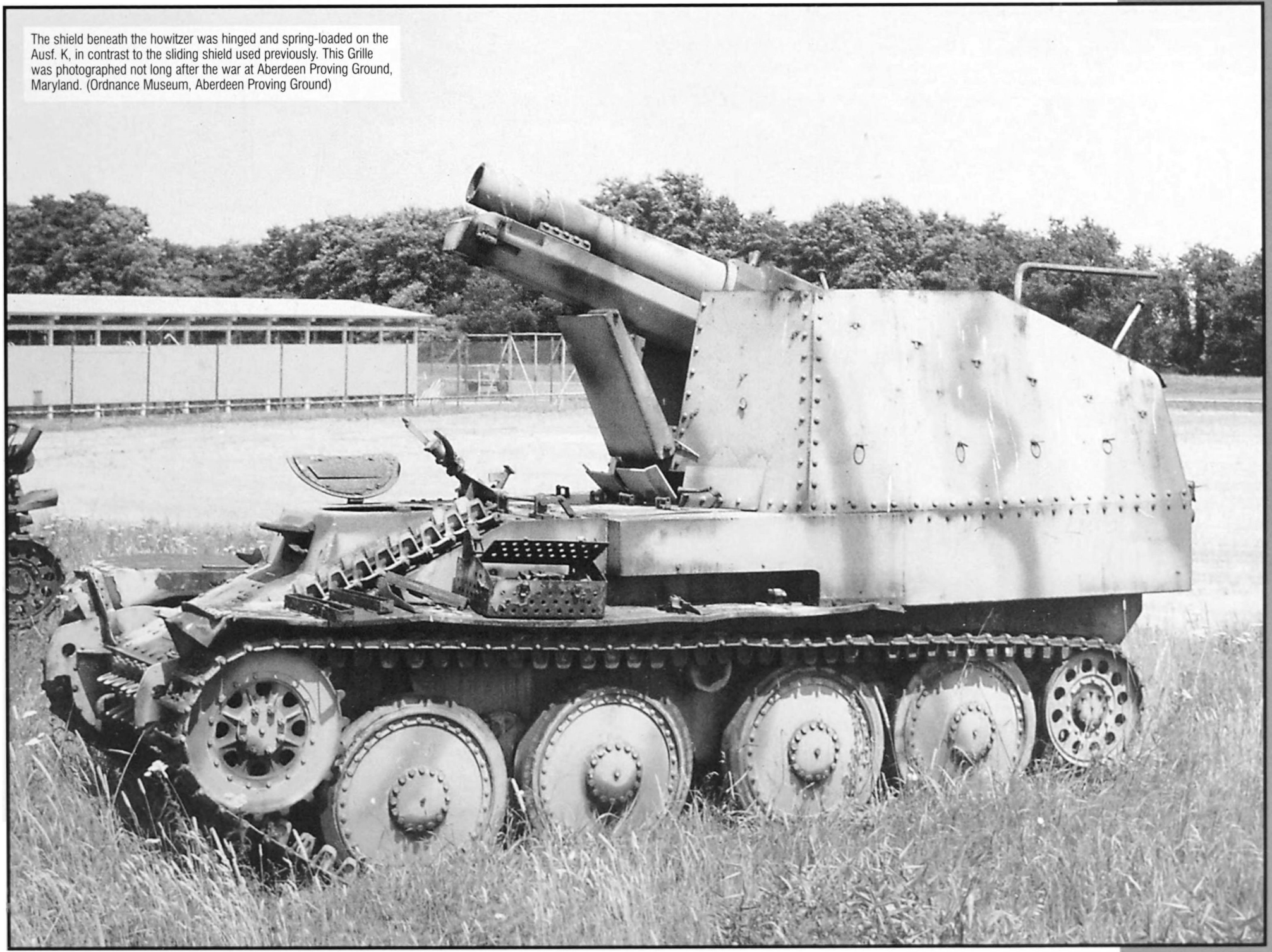




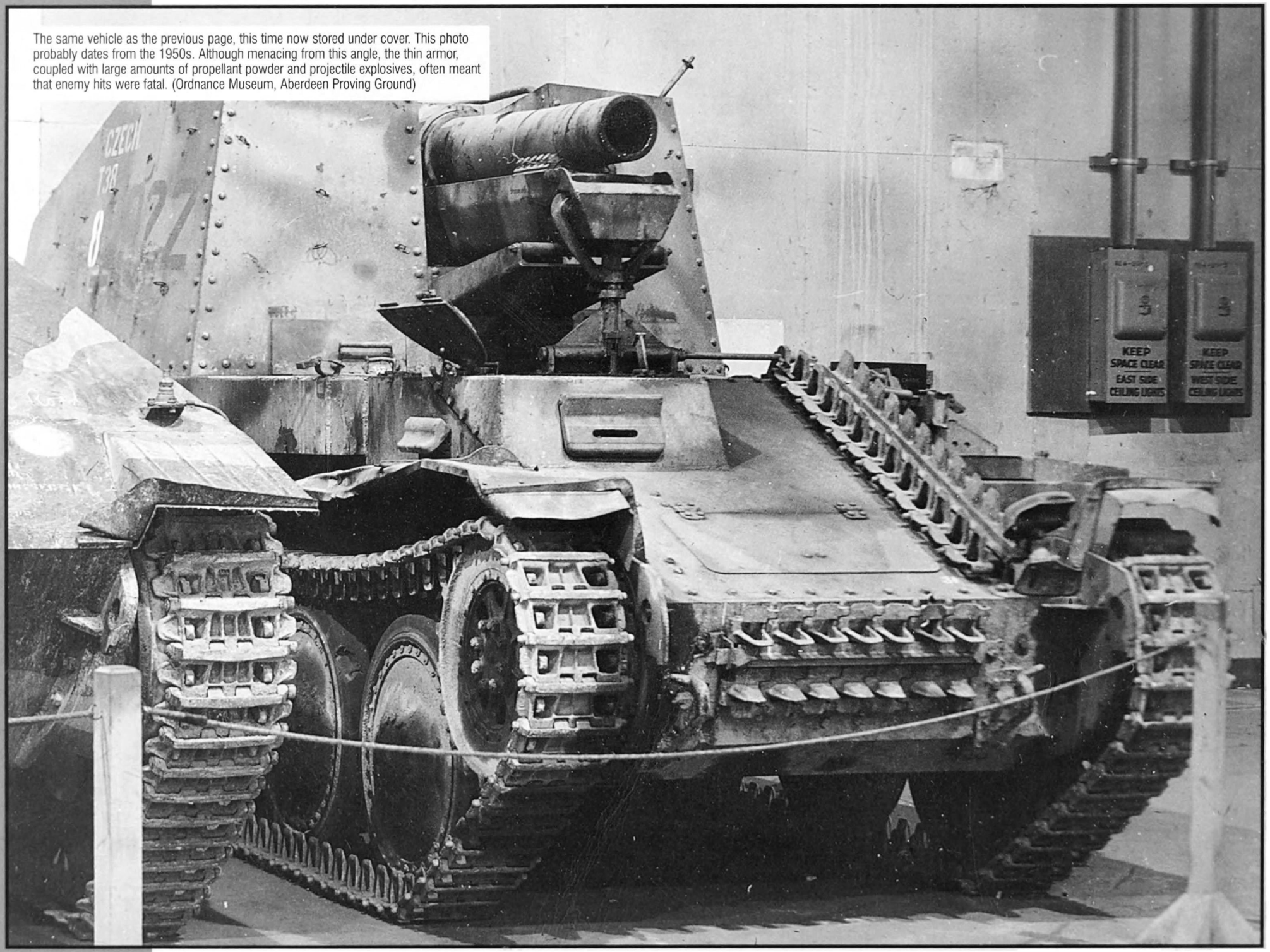
Left: The driver's compartment projected from the sloping front plate of the Grille and incorporated visors permitting visibility forward and to the right. Spare track links were stowed on the hull front and on left side of the glacis to serve both as replacement parts and as supplemental armor. **Right:** Viewed from the behind with the rear apron closed, the muffler is visible. The Ausf. K utilized a Praga AC engine, whereas the earlier model was powered with a TNHPS/II from the same manufacturer. (ČKD archive via Kliment collection, both)



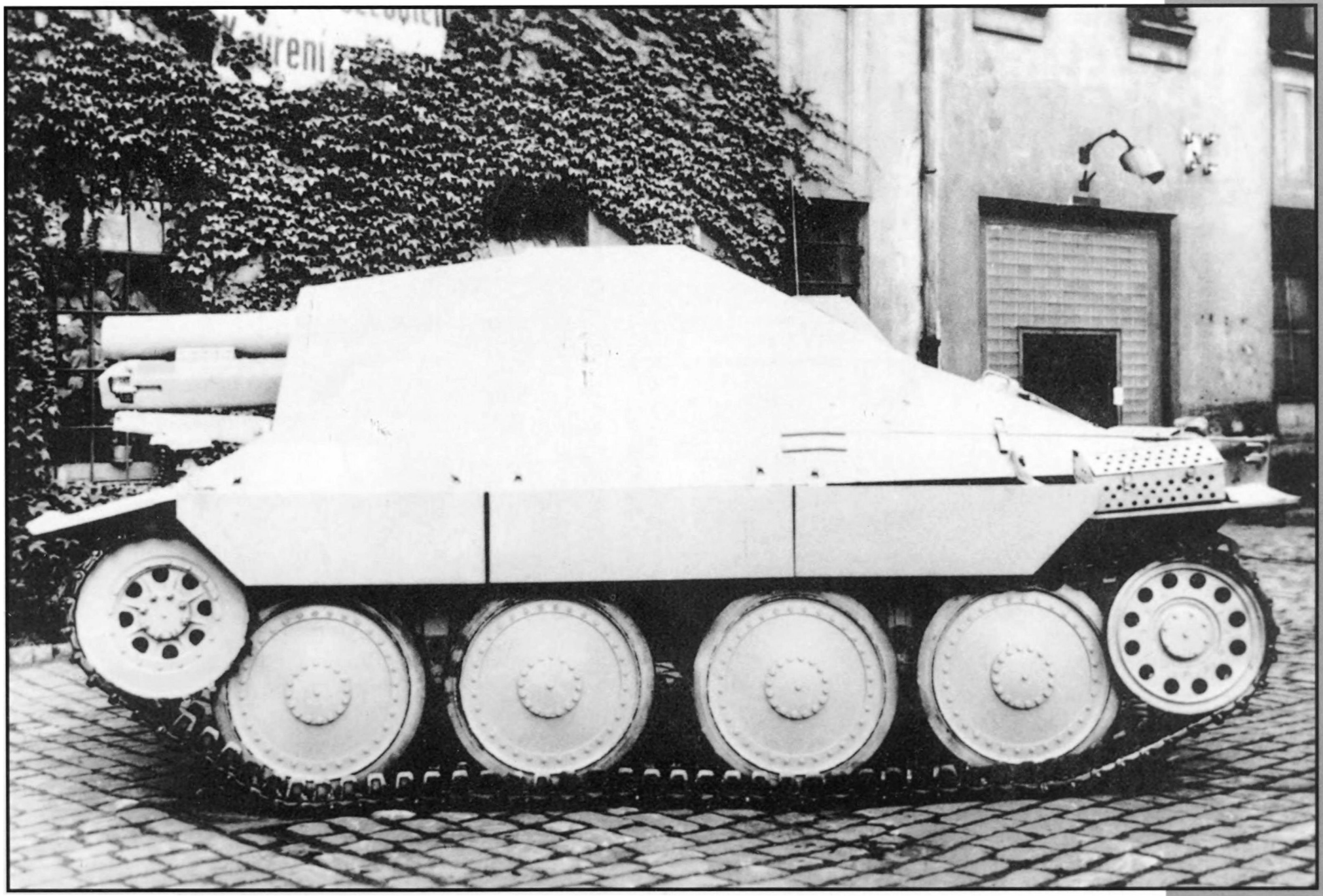
Prepared for a road march or rail transport, this Grille has its canvas cover in place over the fighting compartment and its cannon secured in its travel lock. Despite the success of this design, production was curtailed in order to produce more tank killers, required by Germany's increasingly defensive position. (ČKD archive via Kliment collection)



The shield beneath the howitzer was hinged and spring-loaded on the Ausf. K, in contrast to the sliding shield used previously. This Grille was photographed not long after the war at Aberdeen Proving Ground, Maryland. (Ordnance Museum, Aberdeen Proving Ground)

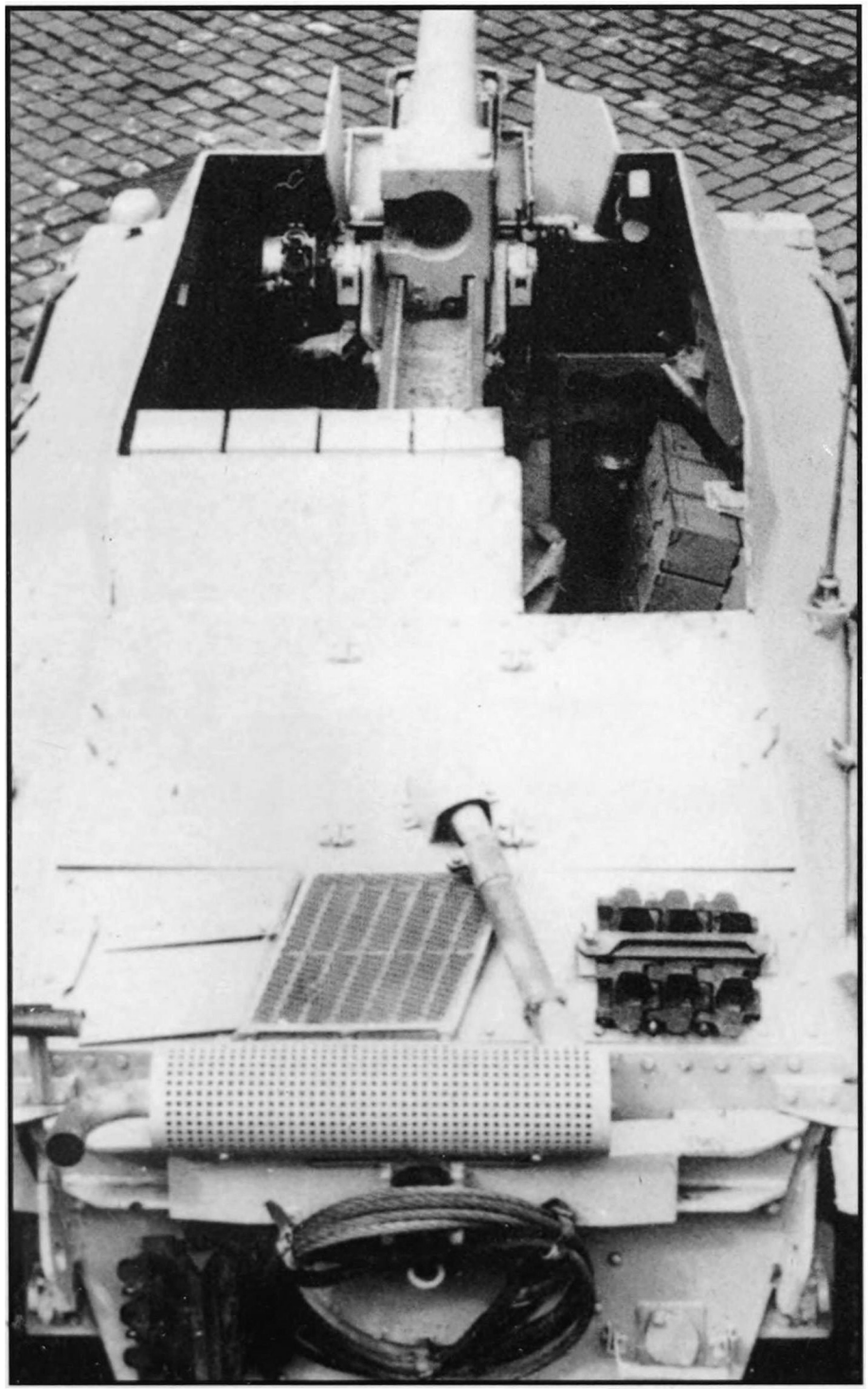


The same vehicle as the previous page, this time now stored under cover. This photo probably dates from the 1950s. Although menacing from this angle, the thin armor, coupled with large amounts of propellant powder and projectile explosives, often meant that enemy hits were fatal. (Ordnance Museum, Aberdeen Proving Ground)

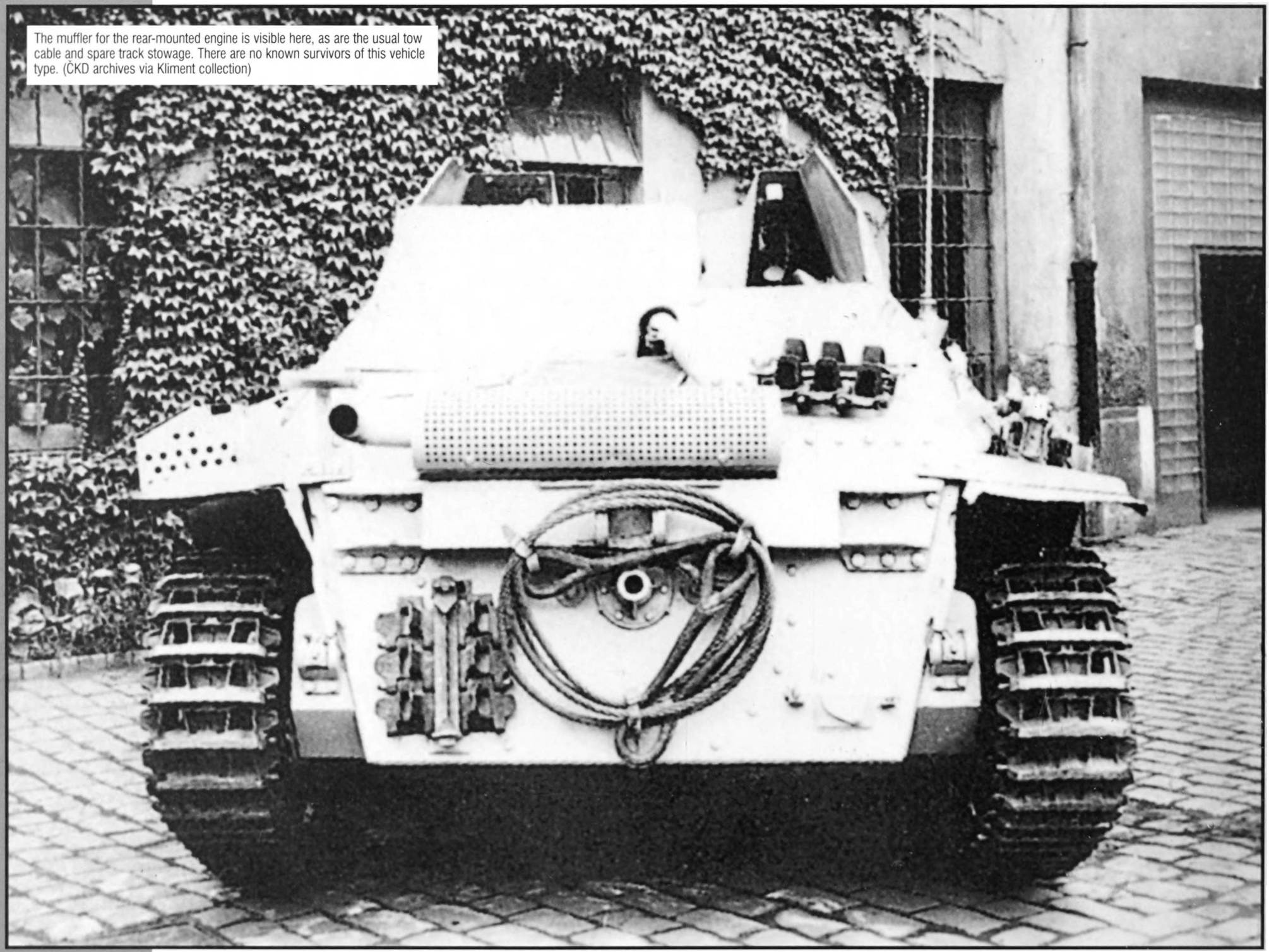


The 15 cm s.I.G. 33/2 (Sf) on Bergepanzerwagen 38 is shrouded in a cloak of mystery. For the past 40 years various sources have stated that up to 24 of these vehicles were built either from converted Bergepanzerwagen 38 or as new construction based on that chassis. However, to date no reliable documentation has surfaced to support these claims. Indeed, there is no mention of series production of these vehicles in either the BMM or Škoda records. Reportedly these vehicles were produced as a stop-gap measure to provide troops with a self-propelled howitzer after Grille production had ceased. Like the late Grille, this vehicle was armed with the 15 cm s.I.G. 33/2 cannon. Only this handful of photographs, apparently of a prototype, proves the vehicle existed at all. Photographed outside the Boemisch-Märische Maschinenfabrik (BMM) plant {as Českomoravská-Kolben-Daněk (ČKD) was known at this time} is a 15 cm s.I.G. 33/2 (Sf) on Bergepanzerwagen 38. (ČKD archives via Kliment collection)

The open-topped superstructure of the Bergepanzer was extended upward, forming a superstructure around the s.I.G. 33/2., the same weapon mounted on the Marder Ausf. K. (ČKD archives via Kliment collection)



Left: With its forward-mounted gun, in many ways this vehicle was a return to the Geschützwagen 38 fuer s.I.G. 33/1 (Sf)(Sd.Kfz. 138/1) 'Grille' design. It is unknown if more than this one vehicle was built on the Bergepanzer chassis. Faintly visible in this photograph are the shell racks and charge boxes. The 15 cm howitzer was a powerful weapon, and as such a valuable asset to infantry movements. (Patton Museum, Fort Knox) **Below:** As the howitzer was elevated, a spring-loaded shield rose to close the resulting opening in the frontal armor as seen here. (ČKD archives via Kliment collection)



The muffler for the rear-mounted engine is visible here, as are the usual tow cable and spare track stowage. There are no known survivors of this vehicle type. (ČKD archives via Kliment collection)

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